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(71) [Applicant]
[Identification Number] 000006013
[Name] Mitsubishi Electric Corp.
[Address] 2-2-3, Marunouchi, Chiyoda-ku, Tokyo
(72) [Inventor(s)]
[Name] Morimoto **
[Address] 2-2-3, Marunouchi, Chiyoda-ku, Tokyo Inside of Mitsubishi Electric Corp.
(72) [Inventor(s)]
[Name] Hirai Yasuyori
[Address] 2-2-3, Marunouchi, Chiyoda-ku, Tokyo Inside of Mitsubishi Electric Corp.
(72) [Inventor(s)]
[Name] Takaya Shiro
[Address] 2-2-3, Marunouchi, Chiyoda-ku, Tokyo Inside of Mitsubishi Electric Corp.
(72) [Inventor(s)]
[Name] Sotoyama **
[Address] 2-2-3, Marunouchi, Chiyoda-ku, Tokyo Inside of Mitsubishi Electric Corp.
(72) [Inventor(s)]

[Name] Iwamoto Shin-ich[redacted]
[Address] 2-2-3, Marunouchi, Chiyoda-ku, Tokyo Inside of Mitsubishi Electric Corp.
(72) [Inventor(s)]
[Name] Kasai Tomohiko
[Address] 2-2-3, Marunouchi, Chiyoda-ku, Tokyo Inside of Mitsubishi Electric Corp.
(74) [Attorney]
[Identification Number] 100082175
[Patent Attorney]
[Name] Takada ** (outside trinominal)

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Epitome

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(57) [Abstract]
[Technical problem] If a compressor is started after liquid cooling intermediation has fallen asleep in the compressor, since the refrigerating machine oil in a compressor will flow out so much temporarily by foaming, no refrigerating machine oil may be unable to be caught also with the highly efficient oil separator. In this case, since it became impossible for the mineral oil, the ester oil, or the ether oil collected out of established piping to be mixed, to separate only ester oil or an ether oil, and to carry out oil returning to a compressor once the new oil flowed out of the exterior unit, the oil of a compressor may have been drained and dependability may have been lost.
[Means for Solution] The extraction separation device which was equipped with the compressor, the heat-source side heat exchanger, and the accumulator, and connected piping and inflow piping between said heat-source side heat exchanger and liquid piping, Piping which connects the lower part and feed-for-extraction inflow piping of said accumulator, and said compressor inhalation piping are branched, and outflow piping, piping to connect, and said compressor inhalation piping are branched, and it has the raffinate reservoir container connect with extract outflow piping, piping to connect, and raffinate outflow piping, and store raffinate. It is.

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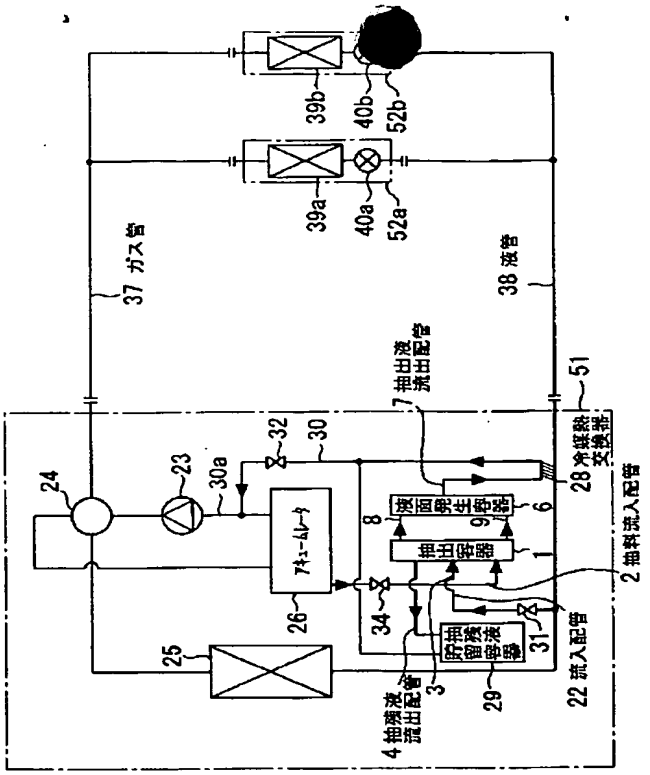

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CLAIMS

[Claim(s)]
[Claim 1] The extraction separation device characterized by having the device in which only raffinate is separated in the extraction separation device in which the consistency of raffinate is smaller than the consistency of an extract while mixing the feed for extraction which solute and diluent mixed, and a solvent by the ratio which carries out two-phase separation and extracting the solute in feed for extraction to a solvent.
[Claim 2] The extraction separation device characterized by having arranged so that the oil level formed by said raffinate outflow piping rather than the oil level which is made to open for free passage the oil-level generating container of each other characterized by providing the following in the lower part and the upper part of the direction of a vertical, respectively, and forms said solvent outflow piping and said raffinate outflow piping by said solvent outflow piping may become high The extract container which has die length in the direction of a vertical, is equipped with raffinate outflow piping arranged in the location higher than solvent inflow piping, feed-for-extraction inflow piping, said solvent inflow piping, and said feed-for-extraction inflow piping, and extracts a predetermined component from feed for extraction with a solvent It has die length in

the direction of a vertical[redacted] is solvent outflow piping.
[Claim 3] The extraction separation device according to claim 2 characterized by having arranged said feed-for-extraction inflow piping in the location lower than said solvent inflow piping.
[Claim 4] Raffinate outflow piping which has die length in the direction of a vertical, and has been arranged in the location higher than solvent inflow piping, feed-for-extraction inflow piping, said solvent inflow piping, and said feed-for-extraction inflow piping, The extract container which is equipped with extract outflow piping arranged in the location lower than said feed-for-extraction inflow piping, and extracts a predetermined component from feed for extraction with a solvent, The extraction separation device characterized by having arranged said raffinate outflow piping so that the oil level formed by said raffinate outflow piping from oil-level height in case only a solvent is in said extract container may become high including the controlling mechanism which makes regularity differential pressure of the base in said extract container, and an oil level.
[Claim 5] The extraction separation device characterized by having arranged so that the oil level formed by said raffinate outflow piping rather than the oil level which is made to open for free passage the oil-level generating container of each other characterized by providing the following in the lower part and the upper part of the direction of a vertical, respectively, and forms said solvent outflow piping and said raffinate outflow piping by said solvent outflow piping may become high It has die length in the direction of a vertical, and is feed-for-extraction inflow piping. Raffinate outflow piping arranged in the location higher than said feed-for-extraction inflow piping The extract container which is equipped with extract outflow piping arranged in the location lower than said feed-for-extraction inflow piping, and extracts a predetermined component from feed for extraction with a solvent It has die length in the direction of a vertical, and they are solvent inflow piping and solvent outflow piping.
[Claim 6] The extraction separation device according to claim 2 to 5 characterized by making the horizontal cross section near the connection of said raffinate outflow piping smaller than the horizontal cross section of a part low near [said] the connection in said extract container.
[Claim 7] Mixed piping into which connect with the extract container which extracts a predetermined component from feed for extraction with a solvent, and said extract container, and mix and a solvent and feed for extraction are made to flow, Raffinate outflow piping which is connected to said extract container and has a check valve, the vent pipe which carries out opening of the end to the lower part in said extract container, and carries out opening of the other end to the upper part, The extraction separation device characterized by having liquid return tubing which carries out opening of the end to the upper part in an extract container, and carries out opening of the other end to the exterior of said extract container, and the communicating tube which opens the pars intermedia of said vent pipe, and the pars intermedia of said liquid return tubing for free passage in a location lower than the connection of said raffinate outflow piping.
[Claim 8] The one apparatus extraction separation device characterized by having formed the accumulator and the extract container according to claim 7 in one, and making the interior of said accumulator carry out opening of said other end of said liquid return tubing.
[Claim 9] Mixed piping into which connect with the extract container which extracts a predetermined component from feed for extraction with a solvent, and said extract container, and mix and a solvent and feed for extraction are made to flow, The vent pipe which carries out opening of the end to the upper part in said extract container, and carries out opening of the other end to the exterior of said extract container, Liquid return tubing which carries out opening of the end to the lower part in said extract container (pars basilaris ossis occipitalis), and carries out opening of the other end to the exterior of said extract container, the extraction separation device characterized by having the float valve which has the middle consistency of the consistency of raffinate, and the consistency of an extract, and opens and closes said end of said liquid return tubing.
[Claim 10] The extraction separation device according to claim 9 characterized by having raffinate outflow piping connected to said extract container in the location higher than the oil-level height of the extract which has a check valve and is controlled by said float valve.

[Claim 11] Heat souce of the refrigerating cycle equipment containing the compressor, the heat-source side heat exchanger, and the accumulator which are characterized by to have had the following, to have connected the lower stream of a river of said heat-source side heat exchanger, and solvent inflow piping of said extraction separation device, to have connected the lower part and said feed-for-extraction inflow piping of said accumulator, to have connected inhalation piping of said compressor, and solvent outflow piping of said oil-level generator, and to connect said raffinate outflow piping and a raffinate storage container. An extraction separation device according to claim 1 to 4 Raffinate reservoir container

[Claim 12] In the heat souce of the refrigerating cycle equipment containing a compressor, a heat-source side heat exchanger, an accumulator, and the oil separator connected to the discharge side of said compressor It has an extraction separation device according to claim 1 to 4 and a raffinate reservoir container. While extracting the lower stream of a river of said oil separator, and solvent inflow piping of said extraction separation device, connecting through a means and connecting the lower part and said feed-for-extraction inflow piping of said accumulator Inhalation piping and said solvent outflow piping of said compressor are connected. And piping between the lower stream of a river of said oil separator, and said drawing means, Heat souce of the refrigerating cycle equipment characterized by having had the refrigerant heat exchanger to which heat exchange of the piping between inhalation piping of said compressor and said solvent outflow piping is carried out, and connecting said raffinate outflow piping and said raffinate storage container.

[Claim 13] Have the following and the lower stream of a river of said heat-source side heat exchanger and solvent inflow piping of said extraction separation device are connected. Connect the lower part and said feed-for-extraction inflow piping of said accumulator, and inhalation piping and said solvent outflow piping of said compressor are connected. Heat souce of the refrigerating cycle equipment containing the compressor, heat-source side heat exchanger, and accumulator which are characterized by having connected inhalation piping and said extract outflow piping of said compressor, and connecting said raffinate outflow piping and a raffinate storage container. An extraction separation device according to claim 5 or 6 Raffinate reservoir container

[Claim 14] Have the following and the lower stream of a river of said heat-source side heat exchanger and solvent inflow piping of said extraction separation device are connected. Connect the oil returning circuit and said feed-for-extraction inflow piping of said oil separator, and inhalation piping and said solvent outflow piping of said compressor are connected. Heat souce of the refrigerating cycle equipment containing the compressor and heat-source side heat exchanger which are characterized by having connected inhalation piping and said extract outflow piping of said compressor, and connecting said raffinate outflow piping and a raffinate storage container, an accumulator, and the oil separator connected to the discharge side of said compressor. An extraction separation device according to claim 5 or 6 Raffinate reservoir container

[Claim 15] Have the following and the lower stream of a river of said heat-source side heat exchanger and mixed piping of said extraction separation device are connected. Connect the oil returning circuit and said mixed piping of said oil separator, and said other end of said liquid return tubing is connected to piping or the device of the low-tension side. Heat souce of the refrigerating cycle equipment containing the compressor and heat-source side heat exchanger which are characterized by connecting said raffinate outflow piping and said raffinate storage container, an accumulator, and the oil separator connected to the discharge side of said compressor. An extraction separation device according to claim 7 to 10 Raffinate reservoir container

[Claim 16] Heat souce of the refrigerating cycle equipment characterized by to have had the raffinate reservoir container, to have connected the lower stream of a river of said heat-source side heat exchanger, and the mixer tube of said extraction separation device in the heat souce of the refrigerating cycle equipment containing a compressor, a heat-source side heat exchanger, an one apparatus accumulator according to claim 8, and the oil separator connected to the discharge side of said compressor, to have connected the oil returning circuit and said

mixer tube of said oil separator, and to connect said raffinate outflow piping and said raffinate storage container.
[Claim 17] Heat souce of the refrigerating cycle equipment according to claim 11 to 16 characterized by establishing the device in which it prevents that the liquid in a raffinate storage container flows backwards to the exterior in said raffinate storage container.
[Claim 18] Heat souce of the refrigerating cycle equipment according to claim 11 to 17 characterized by preparing the adsorption material which adsorbs raffinate or diluent in the interior of said raffinate storage container.
[Claim 19] Claims 11-18 characterized by having considered as the refrigerant of a hydro fluorocarbon system as said solvent, and considering as the mixed oil of either either ester oil or an ether oil mineral oil or a hard alkylbenzene oil as said feed for extraction are not, but it is the heat souce of refrigerating cycle equipment given in **.
[Claim 20] The temperature in said extract container is the heat souce of the refrigerating cycle equipment according to claim 11 to 19 characterized by considering as a low-pressure saturation temperature of a refrigerating cycle.
[Claim 21] Refrigerating cycle equipment characterized by having connected the use side machine containing a use side heat exchanger, and heat souce according to claim 11 to 20 by connecting piping, and constituting a refrigerant circuit.
[Claim 22] Refrigerating cycle equipment according to claim 21 characterized by using the connecting piping of established refrigerating cycle equipment as said connecting piping.
[Claim 23] The updating approach of the refrigerating cycle equipment characterized by permuting a refrigerant while permuting the heat souce of established refrigerating cycle equipment by heat souce according to claim 11 to 20.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the permutation of the refrigerant of refrigerating cycle equipment, or an air-conditioning and a freezer. In more detail, in case the refrigerant of refrigerating cycle equipment is permuted, it is related with the refrigerating cycle equipment using the extraction separation device and it which carry out extraction separation of the existing refrigerating machine oil. When mainly diverting established extended piping used for the frozen air-conditioning machine using a HCFC system refrigerant or a CFC system refrigerant when refrigeration / air-conditioning machine using the HFC system refrigerant as an example was established newly, it is related with refrigeration / air-conditioning machine which has the extraction separation device and the extraction separation device in_which the refrigerating machine oil the HCFC system which remains in established piping, or for CFC system refrigerants is washed and collected.
[0002]

[Description of the Prior [redacted] Drawing 23 is refrigeration / air-conditioning machine which used established piping of a publication for JP,2000-9368,A, and is the conventional example of the refrigerating cycle equipment which washes and collects the mineral oil which remains in established piping. In the refrigerating cycle shown in drawing 23 , when performing air conditioning operation, with the refrigerating machine oil for HFC, the gas refrigerant of elevated-temperature high pressure compressed with the compressor 23 has a compressor 23 breathed out, and goes into an oil separator 53. Here, it dissociates completely, and through a four way valve 24, only a gas refrigerant flows into the heat-source side heat exchanger 25, and condensate-izes the refrigerating machine oil for HFC. The condensate-ized refrigerant flows the first connecting piping C through the first actuation valve 57. When liquid cooling intermediation of HFC flows the first connecting piping C, the mineral oil which remains to the first connecting piping C is washed little by little, and it flows with liquid cooling intermediation of HFC, and flows into an collimator 40, and it decompresses to low voltage, will be in a low-temperature two phase condition, and will evaporative-gas-ize by the load side heat exchanger 39 here. The evaporative-gas-ized refrigerant flows into the second connecting piping D. The mineral oil which is flowing into the second connecting piping D makes driving force shearing force of the mineral oil produced from the speed difference with a gas refrigerant, and a refrigerant-gas interface, and it flows so that [a piping inside] it may be dragged. The gas refrigerant containing the mineral oil which flowed connecting piping D flows into the foreign matter capture means 55 through a four way valve 24. Here, mineral oil is separated from a gas refrigerant and only a gas refrigerant returns to a compressor 23 through an accumulator 26.

[0003] Moreover, drawing 24 is the conventional example of the device in which are the hermetic type compressor of a publication, and control an oil level to JP,09-324756,A and refrigerating machine oil and liquid cooling intermediation are divided into it. The extract opening 66 which formed the extract opening 66 in the same height as the base of the sealing casing 70, and was prepared in the same height as the upper part of the sealing casing 70, a base, and the base of the sealing casing 70 for the extract piping 67 An epilogue, By forming the float 65 which has the specific gravity which is interlocked with the oil level of the liquefied refrigerant 68 which uses HFC as a principal component, and moves into the extract piping 67, from the base in the sealing casing 70, the liquid cooling intermediation which carried out two-phase separation is extracted, and the undissolved lubricating oil 71 is inhaled from a feed pipe 64.

[0004]

[Problem(s) to be Solved by the Invention] With refrigerating cycle equipment given in JP,2000-9368,A, the ester oil or the ether oils which are used as new refrigerating machine oil in an exterior unit needed to be collected completely, the highly efficient oil separator was needed, and the technical problem that structure became complicated or cost started manufacture occurred.

[0005] Furthermore, if a compressor is started after liquid cooling intermediation has fallen asleep in the compressor, since the refrigerating machine oil in a compressor will flow out so much temporarily by foaming, no refrigerating machine oil may be unable to be caught also with the highly efficient oil separator. In this case, since it became impossible for the mineral oil, the ester oil, or the ether oil collected out of established piping to be mixed, to separate only ester oil or an ether oil, and to carry out oil returning to a compressor once the new oil flowed out of the exterior unit, the oil of a compressor may have been drained and dependability may have been lost.

[0006] moreover, at extractor guard as shown in JP,09-324756,A When the mixed oil which the ester oil or the ether oil used as new refrigerating machine oil, and the mineral oil which is refrigerating machine oil which remained in established piping mixed carries out two-phase separation and floats on refrigerant liquid It could not separate and collect only the refrigerating machine oil which remained in established piping, but deteriorated under the effect of the mineral oil with which new ester oil or an ether oil deteriorated, and the technical problem that dependability was lost occurred.

[0007] In the refrigerating cycle equipment, or the refrigeration and the air conditioner which diverts established piping for which it was made in order that this invention might solve an

above-mentioned technical problem, and the first refrigerant, for example, HCFC system, or CFC system refrigerant was used Even when the mineral oil which is refrigerating machine oil of the CFC system which remained in new ester oil, an ether oil, etc. which are refrigerating machine oil of the second refrigerant, for example, a HFC system refrigerant, and established piping, or a HCFC system refrigerating cycle is mixed Refrigeration / air-conditioning machine carrying out the usual operation, separation recovery of the mineral oil which remained in established piping is carried out, degradation of new ester oil or an ether oil is suppressed, construction of refrigeration / air-conditioning machine which uses established piping is made easy, and it aims at raising the dependability of a refrigerating cycle.

[0008]

[Means for Solving the Problem] The extraction separation device by the invention in this application is mixed by the ratio which carries out two-phase separation of the feed for extraction which solute and diluent mixed like and a solvent according to claim 1, and while extracting the solute in feed for extraction to a solvent, the consistency of raffinate is equipped with the device in which only raffinate is separated, in an extraction separation device smaller than the consistency of an extract.

[0009] The extraction separation device by the invention in this application has die length in the direction of a vertical like the publication to claim 2. The extract container which is equipped with raffinate outflow piping arranged in the location higher than solvent inflow piping, feed-for-extraction inflow piping, said solvent inflow piping, and said feed-for-extraction inflow piping, and extracts a predetermined component from feed for extraction with a solvent, The oil-level generating container of each other which has die length in the direction of a vertical, and has solvent outflow piping is made to open for free passage in the lower part and the upper part of the direction of a vertical, respectively. It arranges so that the oil level formed by said raffinate outflow piping rather than the oil level which forms said solvent outflow piping and said raffinate outflow piping by said solvent outflow piping may become high.

[0010] The extraction separation device by the invention in this application arranges said feed-for-extraction inflow piping in a thing according to claim 2 like a publication in a location lower than said solvent inflow piping to claim 3.

[0011] The extraction separation device by the invention in this application Raffinate outflow piping according to claim 4 which has die length in the direction of a vertical, and has been arranged like in the location higher than solvent inflow piping, feed-for-extraction inflow piping, said solvent inflow piping, and said feed-for-extraction inflow piping, The extract container which is equipped with extract outflow piping arranged in the location lower than said feed-for-extraction inflow piping, and extracts a predetermined component from feed for extraction with a solvent, Said raffinate outflow piping is arranged so that the oil level formed by said raffinate outflow piping from oil-level height in case only a solvent is in said extract container may become high including the controlling mechanism which makes regularity differential pressure of the base in said extract container, and an oil level.

[0012] The extraction separation device by the invention in this application has die length in the direction of a vertical like the publication to claim 5. Feed-for-extraction inflow piping, The extract container which is equipped with raffinate outflow piping arranged in the location higher than said feed-for-extraction inflow piping, and extract outflow piping arranged in the location lower than said feed-for-extraction inflow piping, and extracts a predetermined component from feed for extraction with a solvent, The oil-level generating container which has die length in the direction of a vertical, and was equipped with solvent inflow piping and solvent outflow piping It is made mutually open for free passage in the lower part and the upper part of the direction of a vertical, respectively, and it arranges so that the oil level formed by said raffinate outflow piping rather than the oil level which forms said solvent outflow piping and said raffinate outflow piping by said solvent outflow piping may become high.

[0013] The extraction separation device by the invention in this application makes the horizontal cross section near the connection of said raffinate outflow piping smaller than the horizontal cross section of a part low near [said] the connection in a thing according to claim 2 to 5 like the publication to claim 6.

[0014] The extraction separation device by the invention in this application The extract container according to claim 7 which extracts a predetermined component from feed for extraction with a solvent like, Mixed piping into which connect with said extract container, and mix and a solvent and feed for extraction are made to flow, Raffinate outflow piping which is connected to said extract container and has a check valve, the vent pipe which carries out opening of the end to the lower part in said extract container, and carries out opening of the other end to the upper part, It has liquid return tubing which carries out opening of the end to the upper part in an extract container, and carries out opening of the other end to the exterior of said extract container, and the communicating tube which opens the pars intermedia of said vent pipe, and the pars intermedia of said liquid return tubing for free passage in a location lower than the connection of said raffinate outflow piping.

[0015] The extraction separation device by the invention in this application forms an accumulator and an extract container according to claim 7 in one, and makes the interior of said accumulator carry out opening of said other end of said liquid return tubing like the publication to claim 8.

[0016] The extraction separation device by the invention in this application The extract container according to claim 9 which extracts a predetermined component from feed for extraction with a solvent like, Mixed piping into which connect with said extract container, and mix and a solvent and feed for extraction are made to flow, The vent pipe which carries out opening of the end to the upper part in said extract container, and carries out opening of the other end to the exterior of said extract container, It has liquid return tubing which carries out opening of the end to the lower part in said extract container (pars basilaris ossis occipitalis), and carries out opening of the other end to the exterior of said extract container, and the float valve which have the middle consistency of the consistency of raffinate, and the consistency of an extract, and open and close said end of said liquid return tubing.

[0017] The extraction separation device by the invention in this application is equipped with raffinate outflow piping connected to said extract container in the location higher than the oil-level height of the extract which has a check valve in a thing according to claim 9 like, and is controlled by said float valve according to claim 10.

[0018] The heat souce of the refrigerating cycle equipment by the invention in this application In the heat souce of the refrigerating cycle equipment according to claim 11 which contains a compressor, a heat-source side heat exchanger, and an accumulator like It has an extraction separation device according to claim 1 to 4 and a raffinate reservoir container. The lower stream of a river of said heat-source side heat exchanger and solvent inflow piping of said extraction separation device are connected. The lower part and said feed-for-extraction inflow piping of said accumulator are connected, inhalation piping of said compressor and solvent outflow piping of said oil-level generator are connected, and said raffinate outflow piping and a raffinate storage container are connected.

[0019] The heat souce of the refrigerating cycle equipment by the invention in this application In the heat souce of the refrigerating cycle equipment which contains a compressor, a heat-source side heat exchanger, an accumulator, and the oil separator connected to the discharge side of said compressor according to claim 12 like It has an extraction separation device according to claim 1 to 4 and a raffinate reservoir container. While extracting the lower stream of a river of said oil separator, and solvent inflow piping of said extraction separation device, connecting through a means and connecting the lower part and said feed-for-extraction inflow piping of said accumulator Inhalation piping and said solvent outflow piping of said compressor are connected. And piping between the lower stream of a river of said oil separator, and said drawing means, It has the refrigerant heat exchanger to which heat exchange of the piping between inhalation piping of said compressor and said solvent outflow piping is carried out, and said raffinate outflow piping and said raffinate storage container are connected.

[0020] The heat souce of the refrigerating cycle equipment by the invention in this application In the heat souce of the refrigerating cycle equipment according to claim 13 which contains a compressor, a heat-source side heat exchanger, and an accumulator like It has an extraction separation device according to claim 5 or 6 and a raffinate reservoir container. The lower stream

of a river of said heat-source side heat exchanger and solvent inflow piping of said extraction separation device are connected. The lower part and said feed-for-extraction inflow piping of said accumulator are connected, inhalation piping and said solvent outflow piping of said compressor are connected, inhalation piping and said extract outflow piping of said compressor are connected, and said raffinate outflow piping and a raffinate storage container are connected.
[0021] The heat souce of the refrigerating cycle equipment by the invention in this application In the heat souce of the refrigerating cycle equipment which contains a compressor, a heat-source side heat exchanger, an accumulator, and the oil separator connected to the discharge side of said compressor according to claim 14 like It has an extraction separation device according to claim 5 or 6 and a raffinate reservoir container. The lower stream of a river of said heat-source side heat exchanger and solvent inflow piping of said extraction separation device are connected. The oil returning circuit and said feed-for-extraction inflow piping of said oil separator are connected, inhalation piping and said solvent outflow piping of said compressor are connected, inhalation piping and said extract outflow piping of said compressor are connected, and said raffinate outflow piping and a raffinate storage container are connected.
[0022] The heat souce of the refrigerating cycle equipment by the invention in this application In the heat souce of the refrigerating cycle equipment which contains a compressor, a heat-source side heat exchanger, an accumulator, and the oil separator connected to the discharge side of said compressor according to claim 15 like It has an extraction separation device according to claim 7 to 10 and a raffinate reservoir container. The lower stream of a river of said heat-source side heat exchanger and mixed piping of said extraction separation device are connected, the oil returning circuit and said mixed piping of said oil separator are connected, said other end of said liquid return tubing is connected to piping or the device of the low-tension side, and said raffinate outflow piping and said raffinate storage container are connected.
[0023] The heat souce of the refrigerating cycle equipment by the invention in this application In the heat souce of the refrigerating cycle equipment which contains a compressor, a heat-source side heat exchanger, an one apparatus accumulator according to claim 8, and the oil separator connected to the discharge side of said compressor according to claim 16 like It has a raffinate reservoir container, the lower stream of a river of said heat-source side heat exchanger and the mixer tube of said extraction separation device are connected, the oil returning circuit and said mixer tube of said oil separator are connected, and said raffinate outflow piping and said raffinate storage container are connected.
[0024] The heat souce of the refrigerating cycle equipment by the invention in this application prepares the device in which a thing [that the liquid in a raffinate storage container flows backwards to the exterior] according to claim 17 is prevented in said raffinate storage container in a thing according to claim 11 to 16 like.
[0025] The heat souce of the refrigerating cycle equipment by the invention in this application prepares the adsorption material according to claim 18 which adsorbs raffinate or diluent inside said raffinate storage container in a thing according to claim 11 to 17 like.
[0026] Like a publication, in a thing according to claim 11 to 18, it takes as the refrigerant of a hydro fluorocarbon system as said solvent, and heat souce of the refrigerating cycle equipment by the invention in this application is taken as the mixed oil of either either ester oil or an ether oil mineral oil or a hard alkylbenzene oil as said feed for extraction at claim 19.
[0027] Like, it sets to a thing given in either of the claim terms 11-19, and the heat souce of the refrigerating cycle equipment by the invention in this application makes temperature in said extract container a low-pressure saturation temperature of a refrigerating cycle according to claim 20.
[0028] The refrigerating cycle equipment by the invention in this application connects the use side machine according to claim 21 which contains a use side heat exchanger like, and heat souce according to claim 11 to 20 by connecting piping, and constitutes a refrigerant circuit.
[0029] The refrigerating cycle equipment by the invention in this application uses the connecting piping of established refrigerating cycle equipment for claim 22 as said connecting piping in a thing according to claim 21 like a publication.
[0030] The updating approach of the refrigerating cycle equipment by the invention in this

application is a thing acco[redacted]g to claim 23 which permutes a refrigeran[redacted]ke while permuting the heat souce of established refrigerating cycle equipment by heat souce according to claim 11 to 20.

[0031]

[Embodiment of the Invention] The gestalt of operation of this invention is explained with reference to a drawing below at a detail. In addition, among each drawing, the sign identically same into a corresponding part may be attached, and the explanation may be simplified thru/or omitted.

Gestalt 1. drawing 1 of operation shows the refrigerant circuit of the refrigerating cycle equipment which carried the extraction separation device which shows the gestalt 1 of operation of this invention, or a refrigeration and an air conditioner. For 23, as for a four way valve and 25, in drawing 1 , a compressor and 24 are [a heat-source side heat exchanger and 26] accumulators. 1 is an extract container, and it connects with the lower part of an accumulator 26 through the feed-for-extraction inflow piping 2, and it is connected between the heat-source side heat exchanger 25 and a liquid tube 38 through the inflow piping 22 and a valve 31 on the lower stream of a river of the heat-source side heat exchanger 25. Furthermore, it connects with the raffinate reservoir container 29 through the raffinate outflow piping 4, and the upper part of the raffinate storage container 29 and inhalation piping 30a are connected for refrigerant piping. 6 is an oil-level generating container and the extract container 1 and the oil-level generating container 6 are connected by the up interconnecting tube 8 and the lower interconnecting tube 9. An end is connected to the oil-level generating container 6, the other end is connected to inhalation piping 30a of a compressor 23 by piping 30 through the refrigerant heat exchanger 28 and a valve 32, and the outflow piping 7 forms heat souce or an exterior unit 51 by these. Moreover, 39 is a load side heat exchanger or a use side heat exchanger, 40 is an collimator, and the use side machine 52 or an interior unit 52 is formed by these. An exterior unit 51 and an interior unit 52 are connected with a liquid tube 38 (the first connecting piping) and a gas pipe 37 (the second connecting piping). In addition, although a of the suffix of a drawing and b show that they are the multi-type refrigeration and the HVAC system in which two or more interior units exist, they omit Subscripts a and b in explanation for simplification.

[0032] The existing refrigeration and air conditioner with which the refrigerant of the first refrigerant, for example, a HCFC system, or a CFC system, and the first refrigerating machine oil (lubricating oil), for example, mineral oil, or hard alkylbenzene oil was used are permuted by the refrigeration and the air conditioner using the second refrigerant, for example, HFC system refrigerant, and the second refrigerating machine oil (lubricating oil), for example, ester oil, or ether oil, and the above refrigerant circuits are formed.

[0033] The liquid tube used for the unit which filled up the refrigerant of a HCFC system or a CFC system with the case where refrigeration / air-conditioning machine of the above configurations is constructed and the gas pipe or a liquid tube and a gas pipe, and the interior unit were diverted, and when the exterior unit which uses ester oil for refrigerating machine oil using a HFC system refrigerant is established newly, to the liquid tube, the gas pipe, and the interior unit, the mineral oil used as refrigerating machine oil of a HCFC system or a CFC system remains. The actuation at the time of carrying out air conditioning operation of the refrigerating cycle in such the condition is explained. Heat is radiated by the heat-source side heat exchanger 25, it condenses and liquefies, and the hot and high-pressure gas refrigerant which breathed out the compressor 23 flows a liquid tube 38. The liquid cooling intermediation which flows a liquid tube 38 pulls the mineral oil which remains in a liquid tube 38 by the interface shearing force produced between liquid cooling intermediation and mineral oil, and washes the mineral oil in a liquid tube 38 with the shearing. It goes into an interior unit 52, evaporation evaporation is carried out, and the liquid cooling intermediation which flowed the liquid tube 38 flows a gas pipe 37, pulls the mineral oil which remains in gas piping 37 by the shearing force produced between a gas refrigerant and mineral oil, and washes the mineral oil in a gas pipe with the shearing. The gas refrigerant which flowed the gas pipe 37 returns to an exterior unit 51 through return, a four way valve 24, and an accumulator 26 to a compressor 23. At this time, the ester oil carried out from the compressor 23 circulates through under established refrigerant piping with a refrigerant,

and it mixes with the mine[redacted]il which remained in established piping, a[redacted] goes into an accumulator 26 with a refrigerant.

[0034] In separating the mineral oil collected from established piping, a valve 31, a valve 32, and a valve 34 are opened, and even a low-pressure two phase refrigerant is extracted and it leads the high-pressure liquid cooling intermediation with a valve 31 to the extract container 1 through the inflow piping 22. Moreover, from an accumulator 26, the mixed oil of mineral oil and ester oil collected from established piping flows into the extract container 1 through the feed-for-extraction inflow piping 2. With the extract container 1, the ester oil in the mixed oil of mineral oil and ester oil is extracted by the refrigerant, the oil which is rich in the mineral oil which is raffinate serves as the upper layer, and two-phase separation will be carried out, and if the amount of the oil which is rich in mineral oil increases, it will be stored by the raffinate reservoir container 29 through the raffinate outflow piping 4. The mixed liquor of the refrigerant used as a lower layer and the oil which is rich in ester oil flows out of the outflow piping 7 through the inside of the oil-level generating container 6, liquid cooling intermediation evaporates and evaporates it by the refrigerant heat exchanger 28, and only the oil which is rich in ester oil flows into inhalation piping 30a of a compressor 23.

[0035] Next, the actuation at the time of carrying out heating operation is explained. The hot and high-pressure gas refrigerant which breathed out the compressor 23 flows a gas pipe 37, pulls the mineral oil which remains in a gas pipe 37 by the shearing force produced between a gas refrigerant and mineral oil, and washes the mineral oil in a gas pipe with the shearing. Heat is radiated by the load side heat exchanger 39, it condenses and liquefies, and the gas refrigerant which flowed the gas pipe 37 turns into a two phase refrigerant of rat tail low voltage with an collimator 40. This low-pressure two phase refrigerant flows a liquid tube 38, pulls the mineral oil which remains in a liquid tube 38 by the interface shearing force produced between liquid or gas, and mineral oil, and washes the mineral oil in a liquid tube 38 with the shearing. The vapor-liquid two phase refrigerant which flowed the liquid tube 38 goes into an exterior unit 51, evaporates in the heat-source side heat exchanger 25, and returns to a compressor 23 through a four way valve 24 and an accumulator 26. At this time, the ester oil carried out from the compressor 23 circulates through under established refrigerant piping with a refrigerant, and it mixes with the mineral oil which remained in established piping, and goes into an accumulator 26 with a refrigerant. Moreover, to an accumulator 26, liquid cooling intermediation of the amount equivalent to the difference of the amount of need refrigerants in air conditioning and heating can store.

[0036] In separating the mineral oil collected from established piping, a valve 31 is closed and opens a valve 32 and a valve 34. Within an accumulator 26, since excessive liquid cooling intermediation has collected, the mineral oil collected from established piping is two kinds, or [whether it is floating near an oil level, or / having melted into liquid cooling intermediation]. Since the oil which is rich in the mineral oil which is floating near the oil level in an accumulator 26 at this time does not return to a compressor 23 during heating operation, only recovery of the mineral oil which is dissolving in the refrigerant is considered. From an accumulator 26, the mixed oil of mineral oil and ester oil collected from established piping dissolves in a refrigerant, and flows into the extract container 1 through the feed-for-extraction inflow piping 2. With the extract container 1, according to a heat source (not shown), the inside of the extract container 1 is overheated and a refrigerant is evaporated to the specified quantity. Here, a heat source may be arranged on the feed-for-extraction inflow piping 2. At this time, the oil which is rich in the mineral oil of the amount which became more than the solubility to liquid cooling intermediation with reduction of liquid cooling intermediation deposits, and a phase is made near the oil level in the extract container 1. Here, since refrigerant piping connects with inhalation piping 30a of a compressor, the raffinate reservoir container 29 can make the pressure in the raffinate reservoir container 29 lower than the pressure in the extract container 1. Therefore, the oil which is rich in the mineral oil which makes a phase near the oil level of the extract container 1 flows into the raffinate reservoir container 29 from the extract container 1 through the raffinate outflow piping 4 according to the differential pressure of the extract container 1 and the raffinate reservoir container 29, and is stored by the raffinate reservoir container 29. The mixed liquor of the oil

which is rich in a refrigerant and ester oil flows out of the outflow piping 7 through the inside of the oil-level generating container 6, and by the refrigerant heat exchanger 28, liquid cooling intermediation does the evaporation and the evaporation of it a little, and it flows into inhalation piping of a compressor 23.

[0037] Below, the structure of an extraction separation device and the principle of extraction separation are explained. Drawing 2 is the outline block diagram of an extraction separation device. In drawing 2 , 1 is an extract container and the feed-for-extraction inflow piping 2, the solvent inflow piping 3, and the raffinate outflow piping 4 are connected to the extract container 1. Moreover, as for the location which connects these piping, it is desirable to make it the feed for extraction which connects with the extract container 1 from on the direction of a vertical in order of the raffinate outflow piping 4, the solvent inflow piping 3, and the feed-for-extraction inflow piping 2, and goes up the inside of the extract container 1 by buoyancy from a viewpoint which mixes a solvent with a large consistency with feed for extraction with a small consistency, and the solvent which descends the inside of the extract container 1 mixed moderately. 6 is an oil-level generating container and the extract container 1 and the oil-level generating container 6 are connected by the up interconnecting tube 8 and the lower interconnecting tube 9. The outflow piping 7 is connected to the oil-level generating container 6 in a location a little lower than the raffinate outflow piping 4. At this time, the thickness of the raffinate which makes a phase in the extract container 1 in the oil-level upper part determines the difference of the height of the direction of a vertical of the outflow piping 7 and the raffinate outflow piping 4. In addition, when applying the extraction separation device of drawing 2 to the refrigerant circuit of drawing 1 , it becomes what has the the same inflow piping 22 of drawing 1 and the the same solvent inflow piping 3 of drawing 2 .

[0038] The solute separation actuation in the extraction separation device of a configuration of starting is explained. If refrigerant liquid is made to flow from the solvent inflow piping 3, the oil level in the extract container 1 will come to homotopic mostly with the location of the outflow piping 7 from the principle of a pascal. Since the oil-level height formed in the extract container 1 becomes lower than the raffinate outflow piping 4 when the outflow piping 7 considers as a location a little lower than the raffinate outflow piping 4 and raffinate does not occur, it can prevent liquid cooling intermediation flowing out of the raffinate outflow piping 4. Next, from the feed-for-extraction inflow piping 2, if the mixed oil of ester oil and mineral oil is made to flow, ester oil is extracted from the mixed oil of mineral oil and ester oil by the refrigerant in the extract container 1, and the oil which is rich in the mineral oil which is raffinate from a consistency difference will carry out two-phase separation, and will float in a top face. The phenomenon at this time is explained using the mimetic diagram of drawing 3 . Now, in the extract container 1, liquid cooling intermediation shall be contained to the height of H3, mineral oil shall be contained to the height of H2, and refrigerant liquid shall be contained in the oil-level generating container 6 to H1. Difference deltaH of the oil-level height of the extract container 1 and the oil-level generating container 6 becomes large, so that the height of H2 becomes high, as mineral oil shows drawing 4 , since the consistency is smaller than refrigerant liquid. Then, by making outflow piping 7 a little lower than the raffinate outflow piping 4 within the limits of deltaH, it can dissociate within the extract container 1 and the oil which is rich in the mineral oil which makes a phase in the oil-level upper part of the extract container 1 can be discharged from the raffinate outflow piping 4. Moreover, since the oil-level height of the outflow piping 7 and the raffinate outflow piping 4 becomes the same and the outflow piping 7 is in a location a little lower than the raffinate outflow piping 4 when there is no mineral oil in the extract container 1, liquid cooling intermediation does not flow out of the raffinate outflow piping 4.

[0039] Furthermore, ester oil, the mixed oil of mineral oil, and a refrigerant are determined as follows about the ratio made to flow into the extract container 1, and its inflow. A phase separation characteristic curve is shown in drawing 5 , and an equilibrium curve is shown in drawing 6 . If it arranges horizontally, it will be easy to understand mutual relation, but since it cannot arrange horizontally at the time of application from constraint of an application form, it arranges up and down and drawing 5 and drawing 6 are shown. If drawing 5 and drawing 6 are arranged horizontally and it is made for the axis of abscissa of both drawings to be on the same

production, the segment of gment E-J of drawing 5 and J of drawing will be connected on the same production. In drawing 5 , for A, 100% of mineral oil and B are [the presentation of feed for extraction and S of the point of 100% of refrigerants and F] the presentations of a solvent, and sigma is the presentation at the time of assuming that two-phase separation is not carried out, when the feed for extraction of a presentation of F and the solvent of a presentation of S are mixed by a certain ratio. When sigma is in the field which carries out two-phase separation, it separates into the up presentation R and the lower presentation E. E at this time can be determined from the equilibrium curve shown in drawing 6 . It can ask for the ratio PR of the ester oil in a upside phase, and mineral oil as an intersection of the production and Segment AC which connected a B point and R points, and the mixing ratio of feed for extraction and a solvent is determined that the ratio of mineral oil will become the largest. Here, an extract rate determines beforehand the inflow at the time of making ester oil, the mixed oil of mineral oil, and a refrigerant flow into the extract container 1, and passage resistance of piping etc. performs control of the inflow of the mixed oil of the refrigerant to the extract container 1, ester oil, and mineral oil. By setting up about the temperature in the extract container 1 as low as possible, since two-phase separation is carried out even when feed for extraction is a small amount, even the mineral oil of a small amount is separable. Since the oil which carries out two-phase separation and is rich in mineral oil by making it the extract container 1 serve as low voltage becomes easy to deposit in using it combining a refrigerating cycle as shows this extraction separation device especially to drawing 1 , there is effectiveness which raises the sharpness of separation of mineral oil. Moreover, the pressure in the extract container 1 is not suitably cared about with confirming the sharpness of separation of mineral oil in a tentative way as intermediate pressure between high pressure and low voltage. Generally, the temperature in the extract container 1 is good to consider as a low-pressure saturation temperature of a refrigerating cycle.

[0040] Therefore, it is used for the refrigeration and the air conditioner operated using the refrigerant of a CFC system or a HCFC system. In the frozen air conditioner which used established piping for which the mineral oil which is refrigerating machine oil of a CFC system or a HCFC system refrigerating cycle remained, established the exterior unit or the exterior unit, and the interior unit newly, and used the refrigerant of a HFC system for the refrigerant Usually, the mineral oil which remained to established piping or established piping, and an interior unit if needed can be collected operating, and it can prevent that ester oil deteriorates by mixing of the mineral oil and ester oil which deteriorated. In addition, as solute, when a solvent is used as the HFC system refrigerant of R407C, R404A, R410A, and R32 grade, if it is an oil [**** / refrigerants, such as an ether oil,], the same effectiveness will be done so anything to a change of ester oil. Moreover, as an oil which remained in established piping used by the CFC system or the HCFC system, from oil which dissolves in the refrigerant of a CFC system or a HCFC system at a change of mineral oil, as long as a consistency is smaller than liquid cooling intermediation, what kind of refrigerating machine oil is sufficient, for example, there is effectiveness with the same said of a HAB oil.

[0041] Moreover, by arranging the valve of an antisuckback, in the raffinate reservoir container 29, the mineral oil collected in the raffinate reservoir container 29 can flow backwards by falling asleep of a refrigerant etc., and can once prevent re-flowing out into a refrigerant circuit in it. Furthermore, it can prevent cheaply that the mineral oil collected in the raffinate reservoir container 29 once re-flows out into a refrigerant circuit with a simple configuration by building in the adsorbent which adsorbs mineral oil in the raffinate reservoir container 29.

[0042] Moreover, the extraction separation device for separating mineral oil with a more sufficient precision is shown in drawing 7 . In drawing 7 , a of a suffix and b show that two extraction separation devices exist, and are taken as the configuration which connected feed-for-extraction inflow piping 2b with raffinate outflow piping 4a. However, a of a suffix and b may be omitted in the following explanation. In drawing 7 , 1 is an extract container and the feed-for-extraction inflow piping 2, the solvent inflow piping 3, and the raffinate outflow piping 4 are connected to the extract container 1. Moreover, as for the location which connects these piping, it is desirable to make it the feed for extraction which connects with the extract container 1

from on the direction of a vertical in order of the raffinate outflow piping 4, the solvent inflow piping 3, and the feed-for-extraction inflow piping 2, and goes up the inside of the extract container 1 by buoyancy from a viewpoint which mixes a solvent with a large consistency with feed for extraction with a small consistency, and the solvent which descends the inside of the extract container 1 mixed moderately. 6 is an oil-level generating container and the extract container 1 and the oil-level generating container 6 are connected by the up interconnecting tube 8 and the lower interconnecting tube 9. The outflow piping 7 is connected to the oil-level generating container 6 in a location a little lower than the raffinate outflow piping 4. At this time, the thickness of the raffinate which makes a phase in the extract container 1 in the oil-level upper part determines the difference of the height of the direction of a vertical of the outflow piping 7 and the raffinate outflow piping 4.

[0043] Actuation of the extraction separation device of a configuration of starting is explained. From the solvent inflow piping 3a and 3b, if liquid cooling intermediation is made to flow into the extract containers 1a and 1b, the oil level of extract container 1a, oil-level generating container 6a and extract container 1b, and oil-level generating container 6b will go up in the same height respectively. If the oil level in oil-level generating container 6a and 6b comes to the location of the outflow piping 7a and 7b respectively, since liquid cooling intermediation will flow out of the outflow piping 7a and 7b respectively, the oil level of the extract containers 1a and 1b becomes fixed respectively in the location of the outflow piping 7a and 7b. Since the raffinate outflow piping 4a and 4b is in a location higher than the outflow piping 7a and 7b respectively, liquid cooling intermediation does not flow out of the raffinate outflow piping 4a and 4b. Here, if the mixed oil of ester oil and mineral oil is made to flow into extract container 1a, ester oil will be extracted from feed-for-extraction inflow piping 2a by liquid cooling intermediation, and if the oil which is rich in mineral oil carries out two-phase separation and the amount increases, it will flow out of raffinate outflow piping 4a, and will flow into extract container 1b through feed-for-extraction inflow piping 2b. The liquid cooling intermediation in extract container 1b is contacted, ester oil is extracted again, the oil which was further rich in mineral oil carries out two-phase separation of the oil which is rich in the mineral oil which flowed into extract container 1b within extract container 1b, and it flows out of raffinate outflow piping 4b soon.

[0044] Mineral oil separation actuation of the extraction separation device in drawing 7 is explained using drawing 8 . In drawing 8 , for C, 100% of mineral oil and B are [the presentation of feed for extraction and S of the point of 100% of refrigerants and F] the presentations of a solvent, and sigma 1 is the presentation at the time of assuming that two-phase separation is not carried out, when the feed for extraction of a presentation of F and the solvent of a presentation of S are mixed by a certain ratio. sigma 1 is divided into the up presentation R1 and the lower presentation E1. The phase of the upper part of presentation R1 is separated as raffinate, and again, if Solvent S is mixed, it will separate into the up presentation R2 and the lower presentation E2. Since the ratio of the mineral oil in presentation R2 becomes smaller than presentation R1, precision can be raised as an extraction separation device in which mineral oil is separated. In addition, if three or more extraction separation devices are connected and united similarly, higher mineral oil separability ability will be obtained.

[0045] Drawing 9 shows other examples of the refrigerant circuit of a refrigerating cycle in which the extraction separation device by the gestalt 1 of operation of this invention was carried. In drawing 9 , 53 is the oil separator inserted between the discharge side of a compressor 23, and the four way valve 24, and carries out oil returning of the separated oil to an accumulator 26 with the oil returning tubing 35 through an collimator 36. 72 is piping (refrigerant circuit) and is connected to the refrigerant inhalant canal 22 through the valve 31, the refrigerant heat exchanger 28, and the collimator 58 from the outlet side of an oil separator 53. Since others are the same as that of drawing 1 , they omit explanation. As shown in drawing 9 , after the liquid-cooling intermediation made to flow into the inflow piping 22 in this refrigerant circuit carries out the heat exchange of the two phase refrigerant of the low temperature which flows out of the outflow piping 7, and the hot and high-pressure gas refrigerant which flows a refrigerant circuit 72 by the refrigerant heat exchanger 28, condenses and liquefies the refrigerant which flows a refrigerant circuit 72 and extracts that liquefied refrigerant with an collimator 58, it has drawn

into an extract container through inflow piping 22. The same effectiveness is done so also by such configuration.

[0046] In addition, also as follows, the concept of this invention explained above can be summarized. The extraction separation device of this invention separates only raffinate using the difference with the consistency of raffinate, and the consistency of an extract while it mixes the feed for extraction which solute and diluent mixed, and a solvent by the ratio which carries out two-phase separation and extracts the solute in feed for extraction to a solvent. Here, as an example, that with which the ester oil or the ether oil as solute mixed feed for extraction to the mineral oil or the hard alkylbenzene oil as diluent corresponds. Moreover, the refrigerant of a hydro fluorocarbon system corresponds as a solvent. The oil which is rich in the mineral oil or the hard alkylbenzene oil which is the diluent after the ester oil or the ether oil which is solute was extracted as raffinate corresponds.

[0047] Moreover, also as follows, the extraction separation device shown in drawing 2 can be summarized. Namely, while this extraction separation device is equipped with the feed-for-extraction inflow piping 2 which connected the oil-level generating container 6 and the extract container 1 by the up interconnecting tube 8 and the lower interconnecting tube 9, and was connected to the extract container 1, the solvent inflow piping 3, and the raffinate outflow piping 4 The lower part of the end connection of the raffinate outflow piping 4 which connects outflow piping (7) to the oil-level generating container 6, and is connected with the extract container 1 in the extraction separation device in which the consistency of raffinate is smaller than the consistency of an extract, from the oil-level location generated in the solution side generating container 6 is located highly.

[0048] Moreover, also as follows, the heat souce of the refrigerating cycle equipment shown in drawing 1 can be summarized. Namely, this heat souce is equipped with a compressor 23, the heat-source side heat exchanger 25, and an accumulator 26. Piping which connects piping and the inflow piping 22 (it corresponds to the solvent inflow piping 3 of the extraction separation device of drawing 2) between the heat-source side heat exchanger 25 and the liquid piping 38, It has the raffinate storage container 29 which branches piping which connects the lower part and the feed-for-extraction inflow piping 2 of an accumulator 26, and inhalation piping of a compressor 23, is connected with the outflow piping 7, piping to connect, and the raffinate outflow piping 4, and stores raffinate.

[0049] Moreover, also as follows, the heat souce of the refrigerating cycle equipment shown in drawing 9 can be summarized. Namely, this heat souce is equipped with the oil separator 53 connected to the discharge side of a compressor 23, the heat-source side heat exchanger 25, an accumulator 26, and a compressor 23. The piping 72 which connects the lower stream of a river and the inflow piping 22 (it corresponds to the solvent inflow piping 3 of the extraction separation device of drawing 2) of an oil separator 53, It has the raffinate storage container 29 which branches piping which connects the lower part and the feed-for-extraction inflow piping 2 of an accumulator 26, and inhalation piping of a compressor 23, is connected with the outflow piping 7, piping to connect, and the raffinate outflow piping 4, and stores raffinate.

[0050] Gestalt 2. drawing 10 of operation is the schematic diagram of the configuration of the extraction separation device by the gestalt 2 of operation of this invention. Among drawing 10 , it is the hole with which shell, and 11, 12 and 13 were able to be opened in the dashboard, and ten were able to open 14 in the dashboard 11, and the hole which was able to open 15 in the dashboard 13, and let a hole 14 be a location a little lower than a hole 15. 16 and 17 are the holes which were able to be opened in the upper part and the lower part of a dashboard 12. 2 is feed-for-extraction inflow piping, and into the space 43 divided with the dashboard 12 and dashboard 13 in shell 10, the feed-for-extraction inflow piping 2 carries out opening of the end, and is connected. 3 is solvent inflow piping, and into the space 43 divided with the dashboard 12 and dashboard 13 in shell 10, the solvent inflow piping 3 carries out opening of the end, and is connected. Furthermore, 5 is extract outflow piping, and the extract outflow piping 5 carries out opening of the end to the lower parts, such as near the pars basilaris ossis occipitalis in the space 43 divided with the dashboard 12 and dashboard 13 in shell 10, and is connected to them. In addition, the extract outflow piping 5 may carry out opening of the end to the lower part of the

space 42 divided with the [redacted]hboard 11 and dashboard 12 in shell 10, and may connect with it.
[0051] Actuation of the extraction separation device of a configuration of starting is explained. If refrigerant liquid is made to flow from the solvent inflow piping 3, both the oil levels of space 42 and space 43 will go up to a location to a hole 14. If an oil level becomes 14 or more holes, liquid cooling intermediation will flow out of a hole 14 into a space 41 side, and the oil level of space 42 and space 43 will be maintained at the location of a hole 14. Here, if the mixed oil of ester oil and mineral oil is made to flow from the feed-for-extraction inflow piping 2, while ester oil is extracted by refrigerant liquid in space 43, mineral oil will dissociate and the liquid phase which is rich in mineral oil will be formed in the oil-level upper part of space 43 from the consistency difference of mineral oil and refrigerant liquid. If the phase of the oil which is rich in this mineral oil becomes thick, rather than the oil-level height of space 42, the direction of the oil-level height of space 43 will become high, and mineral oil will come to flow into space 44 from a hole 15. Moreover, if the amount of the mineral oil which flows into space 43 decreases, the thickness of the phase of the mineral oil formed in space 43 will decrease, oil-level height will also stop also arriving at the location of a hole 15, and liquid cooling intermediation will not flow into space 44. Therefore, it can manufacture cheaply by uniting with an extraction separation device the container which stores the mineral oil which carried out extraction separation from the mixed oil of ester oil and mineral oil.
[0052] In addition, when applying the extraction separation device of drawing 10 to the refrigerant circuit of drawing 1 , the extract outflow piping 5 of drawing 10 is connected to the location of the outflow piping 7 of drawing 1 . Moreover, since raffinate is stored in the interior in drawing 10 , outside, the thing equivalent to the raffinate outflow piping 4 of drawing 1 has not come. Therefore, it is not necessary to connect.
[0053] In addition, also as follows, the extraction separation device shown in drawing 10 can be summarized. Namely, this extraction separation device connects the space 42 (equivalent to an oil-level generating container) and space 43 (equivalent to an extract container) in shell 10 with a top hole 16 (equivalent to an up interconnecting tube), and the lower hole 17 (equivalent to a lower interconnecting tube). While having the feed-for-extraction inflow piping 2 and the solvent inflow piping 3 which were connected to space 43, and a hole 15 (equivalent to raffinate outflow piping) A hole 14 (equivalent to outflow piping) is formed in space 42, and the hole 15 of space 43 is highly located from the oil-level location generated to space 42 in the extraction separation device in which the consistency of raffinate is smaller than the consistency of an extract.
[0054] Gestalt 3. drawing 11 of operation is the schematic diagram of the configuration of the extraction separation device by the gestalt 3 of operation of this invention. As for 20, an outer cylinder form container and 21 are inner cylinder form containers among drawing 11 , and the outer cylinder form container 20 inner-** the inner cylinder form container 21. Space 42 is formed in the interior of space 43 and the inner cylinder form container 21 between the outer cylinder form container 20 and the inner cylinder form container 21. Moreover, the hole 16 and the hole 17 have opened in the upper part and the lower part of the inner cylinder form container 21. The feed-for-extraction inflow piping 2, the solvent inflow piping 3, and the raffinate outflow piping 4 are connected to space 43. The outflow piping 7 is inserted in space 42, and let the edge of the outflow piping 7 in the space 42 interior in it be a location a little lower than the raffinate outflow piping 4.
[0055] Actuation of the extraction separation device of a configuration of starting is explained. If refrigerant liquid goes into space 43 from the solvent inflow piping 3, refrigerant liquid flows also to space 42 through a hole 17, and the height of the oil level of space 42 and space 43 will become the same, and will rise. If oil-level height rises in space 42 more than the edge of the outflow piping 7, liquid cooling intermediation will flow into the outflow piping 7, and the height of an oil level will be maintained at the location of the edge of the outflow piping 7. At this time, in space 43, an oil level is maintained at homotopic and liquid cooling intermediation does not flow out of the raffinate outflow piping 7. Next, if the mixed oil of ester oil and mineral oil is made to flow from the feed-for-extraction inflow piping 2, ester oil will be extracted by refrigerant liquid, mineral oil will dissociate, and the liquid phase which is rich in mineral oil will be formed in the oil-level upper part of space 43 from the consistency difference of mineral oil and refrigerant

liquid. If the phase of this mineral oil becomes thick, the oil-level height of space 43 will become high rather than the oil-level height of space 42, and the oil which is rich in mineral oil from the raffinate outflow piping 4 will flow out. Therefore, by making an extraction separation device into duplex cylinder structure, it is cheap and can manufacture in a compact. In addition, the extraction separation device of drawing 11 is applicable to refrigerant circuits, such as drawing 1 , as it is.

[0056] In addition, also as follows, the configuration of the extraction separation device shown in drawing 11 can be summarized. This extraction separation device Namely, the space 42 (equivalent to an oil-level generating container) in the inner cylinder form container 21, The space 43 (equivalent to an extract container) formed with the inner cylinder form container 21 and the outer cylinder form container 20 is connected with a top hole 16 (equivalent to an up interconnecting tube), and the lower hole 17 (equivalent to a lower interconnecting tube). While having the feed-for-extraction inflow piping 2 and the solvent inflow piping 3 which were connected to space 43, and the raffinate outflow piping 4 The outflow piping 7 is formed in space 42, and the raffinate outflow piping 4 of space 43 is highly located from the oil-level location generated to space 42 in the extraction separation device in which the consistency of raffinate is smaller than the consistency of an extract.

[0057] Gestalt 4. drawing 12 of operation is the schematic diagram of the configuration of the extraction separation device by the gestalt 4 of operation of this invention. In drawing 12 , 1 is an extract container and sequential connection of raffinate outflow piping, the solvent inflow piping 3, the feed-for-extraction inflow piping 2, and the extract outflow piping 7 is made from the upper part at the extract container 1. Moreover, a solenoid valve 96 is arranged in the extract outflow piping 7. Furthermore, into the gas of the upper part of the extract container 1, the 2nd pressure sensor 99 is installed into the 1st pressure sensor 98 and the liquid of the pars basilaris ossis occipitalis of an extract, and a solenoid valve 96 is opened from the detection value of the 1st pressure sensor 98 and the 2nd pressure sensor 99 and closed through a controller 97. Actuation is explained. A solvent flows into the extract container 1 from the solvent inflow piping 3, and feed for extraction flows, feed for extraction is mixed with a solvent within the extract container 1, and it separates into raffinate and an extract from the feed-for-extraction inflow piping 2. The height of the raffinate in the extract container 1 and the interface of the gas section can be made higher than oil-level height in case there is only an extract, so that the amount of raffinate with a light consistency increases by controlling by the switching action of a solenoid valve 96 here so that the difference of detection of the 1st pressure sensor 98 and the 2nd pressure sensor 99 becomes fixed. Therefore, it becomes possible by connecting the raffinate outflow piping 4 with the extract container 1 in a location higher than oil-level height in case there is only an extract to make only raffinate flow out of the raffinate outflow piping 4. In addition, when applying the extraction separation device of drawing 12 to the refrigerant circuit of drawing 1 or drawing 9 , the extract outflow piping 5 of drawing 10 is connected to the outflow piping 7 of drawing 1 or drawing 9 .

[0058] Moreover, also as follows, the configuration of the extraction separation device shown in drawing 12 can be summarized. Namely, it sets in the extraction separation device in which the consistency of raffinate is smaller than the consistency of an extract. The controlling mechanism which is equipped with the extract container 1, and the feed-for-extraction inflow piping 2 connected to the extract container 1, the solvent inflow piping 3, the extract outflow piping 5 and the raffinate outflow piping 4, and sets constant differential pressure of the oil level of the raffinate in the extract container 1, and the base of the extract container 1, The lower part of the end connection of the raffinate outflow piping 4 is highly located from oil-level height in case differential pressure is fixed and only a solvent is in the extract container 1.

[0059] Gestalt 5. drawing 13 of operation shows the refrigerant circuit of a refrigerating cycle in which the extraction separation device by the gestalt 5 of operation of this invention was carried. For 23, as for a four way valve and 25, in drawing 13 , a compressor and 24 are [a heat-source side heat exchanger and 26] accumulators. 1 is an extract container, and the extract container 1 is connected to the raffinate reservoir container 29 through the raffinate outflow piping 4 while connecting with an accumulator 26 through the feed-for-extraction inflow piping 2

and a valve 59. 6 is an oil-level generating container and the extract container 1 and the oil-level generating container 6 are connected by the up interconnecting tube 8 and the lower interconnecting tube 9. An end is connected to the oil-level generating container 6, and the other end is connected to inhalation piping 30a of a compressor 23 for the outflow piping 7 through the refrigerant heat exchanger 28 and a valve 32. Furthermore, the inflow piping 22 is connected between the heat-source side heat exchanger 25 and a liquid tube 38 through a valve 31. The extract outflow piping 5 is connected with piping between the outflow piping 7 and the refrigerant heat exchanger 28. An exterior unit 51 is formed by the above configuration. Moreover, 39 is a load side heat exchanger, 40 is an collimator, and an interior unit 52 is formed by these. An exterior unit 51 and an interior unit 52 are connected with a liquid tube 38 and a gas pipe 37. In addition, in drawing 13 , although a of a suffix and b show that they are the multi-type refrigeration and the HVAC system in which two or more interior units exist, they may omit a suffix by explanation for simplification.

[0060] The liquid tube and the gas pipe or the liquid tube and the gas pipe, and interior unit which were used for the unit which filled up the refrigerant of a HCFC system or a CFC system with the case where refrigeration / air-conditioning machine of the above configurations is constructed were diverted, and when the exterior unit which uses ester oil for a refrigerant at a HFC system refrigerant and refrigerating machine oil is established newly, to the liquid tube, the gas pipe, and the interior unit, the mineral oil used as refrigerating machine oil of a HCFC system or a CFC system remains. The actuation at the time of carrying out air conditioning operation of the refrigerating cycle in such the condition is explained. The hot and high-pressure gas refrigerant which breathed out the compressor 23 radiates heat by the heat-source side heat exchanger, it condenses and liquefies, and it flows a liquid tube 38, pulls the mineral oil which remains in a liquid tube 38 by the interface shearing force produced between liquid or gas, and mineral oil, and washes the mineral oil in a liquid tube 38 with the shearing. It goes into an interior unit 52, evaporation evaporation is carried out, and the liquid cooling intermediation which flowed the liquid tube 38 flows a gas pipe 37, pulls the mineral oil which remains in gas piping by the shearing force produced between a gas refrigerant and mineral oil, and washes the mineral oil in a gas pipe with the shearing. The gas refrigerant which flowed the gas pipe 37 returns to an exterior unit 51 through return, a four way valve 24, and an accumulator 26 to a compressor 23. At this time, the ester oil carried out from the compressor circulates through under established refrigerant piping with a refrigerant, and it mixes with the mineral oil which remained in established piping, and goes into an accumulator 26 with a refrigerant.

[0061] Drawing 14 is the schematic diagram of the configuration of the extraction separation device by the gestalt 5 of operation of this invention, and can be applied to the refrigerating cycle equipment of drawing 13 . Among drawing 14 , one is an extract container and the feed-for-extraction inflow piping 2, the raffinate outflow piping 4, and the extract outflow piping 5 are connected to the extract container 1. 6 is an oil-level generating container and the extract container 1 and the oil-level generating container 6 are connected by the up interconnecting tube 8 and the lower interconnecting tube 9. Moreover, the inflow piping 22 and the outflow piping 7 are connected to the oil-level generating container 6. Here, the connecting location of the outflow piping 7 and the oil-level generating container 6 is made a little lower in the direction of a vertical than the raffinate outflow piping 4.

[0062] Actuation of the extraction separation device of a configuration of starting is explained. If a vapor-liquid two phase refrigerant is made to flow into the oil-level generating container 6 from the inflow piping 22 and it is made to flow out of the outflow piping 7, an oil level will occur in the location of the outflow piping 7. Moreover, since the oil-level generating container 6 and the extract container 1 are connected with the up crossfire tube 8 and the lower crossfire tube 9, equalization is carried out and an oil level arises also in the extract container 1 in the outflow piping 7 and homotopic. Here, if the mixed oil of ester oil and mineral oil is made to flow from the feed-for-extraction inflow piping 2, ester oil will be extracted by refrigerant liquid, mineral oil will dissociate, and the liquid phase which is rich in mineral oil will be formed in the oil-level upper part of the extract container 1 from the consistency difference of mineral oil and refrigerant liquid. If the phase of this mineral oil becomes thick, rather than the oil-level height of the oil-

level generating container [redacted] the direction of the oil-level height of the extract container 1 will become high, and mineral oil will flow out of the raffinate outflow piping 4.

[0063] Drawing 15 is the schematic diagram of the modification of the configuration of the extraction separation device by the gestalt 5 of operation of this invention. Since the height of the phase of the separated mineral oil can be made high as shown in drawing 15 when there is little mineral oil separated in the extract container 1 by making the horizontal cross section near the connection of the raffinate outflow piping 4 smaller than the horizontal cross section of other parts, especially a part low near the connection of the raffinate outflow piping 4 or, separation also of the mineral oil of a small amount is attained.

[0064] Drawing 16 shows other examples of the refrigerant circuit of a refrigerating cycle in which the extraction separation device by the gestalt 5 of operation of this invention was carried. For a compressor and 53, as for a four way valve and 25, in drawing 16 , an oil separator and 24 are [23 / a heat-source side heat exchanger and 26] accumulators. 1 is an extract container, and the extract container 1 is connected to the raffinate reservoir container 29 through the raffinate outflow piping 4 while connecting with the oil returning circuit 35 through the feed-for-extraction inflow piping 2 and a valve 34. 6 is an oil-level generating container and the extract container 1 and the oil-level generating container 6 are connected by the up interconnecting tube 8 and the lower interconnecting tube 9. An end is connected to the oil-level generating container 6, and the other end is connected to inhalation piping 30a of a compressor 23 for the outflow piping 7 through the refrigerant heat exchanger 28 and a valve 32. Furthermore, the inflow piping 22 is connected between the heat-source side heat exchanger 25 and a liquid tube 38 through a valve 31. The extract outflow piping 5 is connected with piping between the outflow piping 7 and the refrigerant heat exchanger 28. An exterior unit 51 is formed as mentioned above. Moreover, 39 is a load side heat exchanger, 40 is an collimator, and an interior unit 52 is formed by these. An exterior unit 51 and an interior unit 52 are connected with a liquid tube 38 and a gas pipe 37. In addition, in drawing 16 , although a of a suffix and b show that they are the multi-type refrigeration and the HVAC system in which two or more interior units exist, they omit a publication by explanation for simplification.

[0065] The liquid tube and the gas pipe or the liquid tube and the gas pipe, and interior unit which were used for the unit which filled up the refrigerant of a HCFC system or a CFC system with the case where refrigeration / air-conditioning machine of the above configurations is constructed were diverted, and when the exterior unit which uses ester oil for a refrigerant at a HFC system refrigerant and refrigerating machine oil is established newly, to the liquid tube, the gas pipe, and the interior unit, the mineral oil used as refrigerating machine oil of a HCFC system or a CFC system remains. The actuation at the time of carrying out air conditioning operation of the refrigerating cycle in such the condition is explained. The hot and high-pressure gas refrigerant which breathed out the compressor 23 radiates heat by the heat-source side heat exchanger, it condenses and liquefies, and it flows a liquid tube 38, pulls the mineral oil which remains in a liquid tube 38 by the interface shearing force produced between liquid or gas, and mineral oil, and washes the mineral oil in a liquid tube 38 with the shearing. It goes into an interior unit 52, evaporation evaporation is carried out, and the liquid cooling intermediation which flowed the liquid tube 38 flows a gas pipe 37, pulls the mineral oil which remains in gas piping by the shearing force produced between a gas refrigerant and mineral oil, and washes the mineral oil in a gas pipe with the shearing. The gas refrigerant which flowed the gas pipe 37 returns to an exterior unit 51 through return, a four way valve 24, and an accumulator 26 to a compressor 23. At this time, the ester oil carried out from the compressor 23 circulates through under established refrigerant piping with a refrigerant, and it mixes with the mineral oil which remained in established piping, and goes into an accumulator 26 with a refrigerant.

[0066] In separating the mineral oil collected from established piping, a valve 31, a valve 32, and a valve 34 are opened, and even a low-pressure two phase refrigerant is extracted and it leads the high-pressure liquid cooling intermediation with a valve 31 to the oil-level generating container 6 through the inflow piping 22. Moreover, from the oil returning circuit 35, the mixed oil of mineral oil and ester oil collected from established piping is extracted to low voltage with a valve 34, and flows into the extract container 1 through the feed-for-extraction inflow piping 2.

The oil which is rich in the mineral oil which is raffinate serves as the upper layer, ester oil is extracted by the refrigerant with the extract container 1, two-phase separation is carried out, and if the thickness of the layer which is rich in mineral oil becomes thick, the oil which is rich in mineral oil will flow in the raffinate reservoir container 29 through the raffinate outflow piping 4, and it will be stored. After joining the vapor-liquid two phase refrigerant which the mixed liquor of the refrigerant which is an extract, and the oil which is rich in ester oil flowed out of the extract outflow piping 5, and flowed out of the outflow piping 7, liquid cooling intermediation evaporates and evaporates by the refrigerant heat exchanger 28, and only the oil which is rich in ester oil flows into inhalation piping of a compressor 23.

[0067] Therefore, since a refrigerant flow rate can take the large differential pressure of an oil separator 53 and the extract container 1 and can make smooth a flow of the oil to the extract container 1 also in the conditions which differential pressure cannot attach easily in a refrigerant circuit small, extraction separation can be carried out in the large operating range of a refrigerating cycle.

[0068] In addition, also as follows, the configuration of the heat souce of the refrigerating cycle equipment shown in drawing 16 can be summarized. Namely, this heat souce is equipped with a compressor 23, the oil separator 53 connected to the discharge side of this compressor 23, the heat-source side heat exchanger 25, and an accumulator 26. An extraction separation device given in drawing 14 and drawing 15 which connected piping and inflow piping (22) between the heat-source side heat exchanger 25 and the liquid piping 27, The oil returning circuit 35 which extracts from an oil separator 53 and carries out oil returning to an accumulator 26 through a device 36, Piping which branches the oil returning circuit 35 and connects the feed-for-extraction inflow piping 2, and piping which branches and connects inhalation piping of a compressor 23 with the outflow piping 7, It has the raffinate storage container which branches inhalation piping of a compressor 23, is connected with the extract outflow piping 5, piping to connect, and the raffinate outflow piping 4, and stores raffinate.

[0069] Gestalt 6. drawing 17 of operation shows the refrigerant circuit of a refrigerating cycle in which the extraction separation device by the gestalt 6 of operation of this invention was carried. For a compressor and 53, as for a four way valve and 25, in drawing 17 , an oil separator and 24 are [23 / a heat-source side heat exchanger and 26] accumulators. The interior of an accumulator 26 is separated into up space 26a and lower space 26b by the dashboard 83, and up space 26a and lower space 26b are opened for free passage with the refrigerant return tubing 75. 73 is the vent pipe which opened both ends wide, and a vent pipe 73 is installed so that an end may be located in the upper part of up space 26a and it may be located in the pars basilaris ossis occipitalis of up space 26a in the other end. Moreover, the distance of the direction of a vertical from a dashboard 83 is each equal middle location, and a vent pipe 73 and the refrigerant return tubing 75 are opened for free passage by the communicating tube 74. 76 is a U tube which the demister for vapor liquid separation and 84 carry out opening of the end to the upper part of lower space 26b, and carries out opening of the other end to the exterior of an accumulator 26, and the lowest edge of U characters is installed so that it may come to the location of the pars basilaris ossis occipitalis of lower space 26b. Moreover, the oil returning hole 77 has opened near the lowest edge of a U tube. 29 is a raffinate reservoir container and is opened for free passage through the raffinate outflow piping 4 and a check valve 80 with up space 26a. As for the raffinate outflow piping 4, it is more desirable than the communicating tube 74 to connect with a location about higher than the sum of the radius of each piping. Moreover, the upper part of the raffinate reservoir container 29 is connected with a U tube outlet through the back pressure tubing 85 and diaphragm 79.

[0070] The liquid tube used for the unit which filled up the refrigerant of a HCFC system or a CFC system with the case where refrigeration / air-conditioning machine of the above configurations is constructed and the gas pipe or a liquid tube and a gas pipe, and the interior unit were diverted, and when the exterior unit which uses ester oil for a refrigerant at a HFC system refrigerant and refrigerating machine oil is established newly, to the liquid tube, the gas pipe, and the interior unit, the mineral oil used as refrigerating machine oil of a HCFC system or a CFC system remains. The actuation at the time of carrying out air conditioning operation of

the refrigerating cycle in [redacted] the condition is explained. With an oil separator 53, spraying of the ester oil contained in a gas refrigerant is separated, and heat is radiated by the heat-source side heat exchanger 25, it condenses and liquefies, and the hot and high-pressure gas refrigerant which breathed out the compressor 23 flows a liquid tube 38. The liquid cooling intermediation which flows a liquid tube 38 pulls the mineral oil which remains in a liquid tube 38 by the interface shearing force produced between liquid cooling intermediation and mineral oil, and washes the mineral oil in a liquid tube with the shearing. It goes into an interior unit 52, evaporation evaporation is carried out, and the liquid cooling intermediation which flowed the liquid tube 38 flows a gas pipe 37, pulls the mineral oil which remains in gas piping by the shearing force produced between a gas refrigerant and mineral oil, and washes the mineral oil in a gas pipe with the shearing. The gas refrigerant which flowed the gas pipe 37 returns to an exterior unit 51 through return, a four way valve 24, and an accumulator 26 to a compressor 23.

[0071] Here, separation actuation of the mineral oil in the accumulator 26 interior is explained. When the mineral oil which remained in established piping is mixed with the ester oil of the compressor 23 interior, the mixed oil of ester oil and mineral oil separated with the oil separator 53 extracts as the oil returning piping 35, flows into the mixed piping (inhalation piping) 45 of an accumulator 26 through 36, and is mixed with the mineral oil collected from established piping. Furthermore, the liquid cooling intermediation condensed by the heat-source side heat exchanger 25 extracts, and it flows into the mixed piping (inhalation piping) 45 of the rat tail accumulator 26 to low voltage by 78, and it is mixed with said ester oil and mixed oil of mineral oil, ester oil is extracted from the mixed oil of ester oil and mineral oil by refrigerant liquid, and it flows into an accumulator 26. The demister 76 for vapor liquid separation separates into a gas refrigerant and a liquid, and the refrigerant liquid into which the refrigerant-gas ester oil which flowed into the accumulator 26 melted, and the mineral oil into which ester oil melted slightly go into up space 26a by it. The gas refrigerant in up space 26a flows into lower space 26b through the refrigerant return tubing 75, flows U tube 84, and returns to a compressor 23. The liquid separated by the demister 76 for vapor liquid separation collects on the pars basilaris ossis occipitalis of the up space 26, and the refrigerant liquid into which an upper phase and ester oil melted [the mineral oil into which ester oil melted slightly] serves as a lower phase, and carries out two-phase separation of it. The raffinate reservoir container 29 is covered with the mineral oil into which ester oil melted slightly [an upper phase] through the raffinate outflow piping 4 and a check valve 80. The liquid cooling intermediation into which the ester oil which makes the lower phase of up space 26a melted on the other hand is pushed on the pressure of an upper phase, goes up a vent pipe 73, flows to lower space 26b through the communicating tube 74 and the refrigerant return tubing 75, and collects on the pars basilaris ossis occipitalis of lower space 26b. Only the amount according to a refrigerant flow rate flows into the U tube 84 interior from the oil returning hole 77, and the liquid cooling intermediation into which ester oil collected on the pars basilaris ossis occipitalis of lower space 26b melted flows into a compressor 23 with a refrigerant gas.

[0072] Next, the actuation at the time of carrying out heating operation is explained. The hot and high-pressure gas refrigerant which breathed out the compressor 23 flows a gas pipe 37, pulls the mineral oil which remains in a gas pipe 37 by the shearing force produced between a gas refrigerant and mineral oil, and washes the mineral oil in a gas pipe with the shearing. Heat is radiated by the load side heat exchanger 39, it condenses and liquefies, and the gas refrigerant which flowed the gas pipe 37 turns into a two phase refrigerant of rat tail low voltage with an collimator 40. This low-pressure two phase refrigerant flows a liquid tube 38, pulls the mineral oil which remains in a liquid tube 38 by the interface shearing force produced between liquid or gas, and mineral oil, and washes the mineral oil in a liquid tube 38 with the shearing. The vapor-liquid two phase refrigerant which flowed the liquid tube 38 goes into an exterior unit 51, evaporates in the heat-source side heat exchanger 25, and returns to a compressor 23 through a four way valve 24 and an accumulator 26. At this time, the ester oil carried out from the compressor 23 circulates through under established refrigerant piping with a refrigerant, and it mixes with the mineral oil which remained in established piping, and goes into an accumulator 26 with a refrigerant. Moreover, to an accumulator 26, liquid cooling intermediation of the amount

equivalent to the differen[redacted] the amount of need refrigerants in air conditioning and heating can store. Here, separation actuation of the mineral oil in the accumulator 26 interior is the same as that of the time of air conditioning.

[0073] Therefore, since it mixes efficiently by mixing mineral oil, the mixed oil of ester oil, and refrigerant liquid in the mixed piping (inhalation piping) 45 of an accumulator 26, the extract of the ester oil to refrigerant liquid can be ensured. Consequently, the mineral oil collected from established piping can be separated certainly, and the dependability of a refrigerating cycle can be raised.

[0074] Drawing 18 shows other examples of the refrigerant circuit of a refrigerating cycle in which the extraction separation device by the gestalt 6 of operation of this invention was carried. Although above-mentioned drawing 16 showed the example which divided the accumulator 26 into two steps of upper and lower sides with the dashboard 83, the same effectiveness can be acquired also in the example shown in drawing 18 . That is, if the height of dashboard 83b is made into the height between clearance 93a and clearance 93b while dividing into the space 94a and 94b on either side and preparing upside clearance 93a and lower clearance 93b in dashboard 83a by dashboard 83a and dashboard 83b, the refrigerant liquid into which an upper phase and ester oil melted [the mineral oil into which ester oil melted slightly] will serve as a lower phase, and will carry out two-phase separation to space 94a. Liquid cooling intermediation of the pars basilaris ossis occipitalis of space 94a collects between dashboard 83a and dashboard 83b through clearance 93b. If the height of the refrigerant oil level between dashboard 83a and dashboard 83b also rises and the height comes to the upper limit of dashboard 83b as the amount of the mineral oil in space 94a increases, since it will come to flow into space 94b, mineral oil can be accumulated in space 94a.

[0075] In addition, also as follows, the configuration of the extraction separation device shown in drawing 17 can be summarized. Namely, the vent pipe 73 which this extraction separation device carries out opening of the end to the upper part in the extract container 1, and carries out opening of the other end to extract container 1 pars basilaris ossis occipitalis, The liquid return tubing 75 which carries out opening of the end to the upper part of the extract container 1, and carries out opening of the other end out of the extract container 1, In the extraction separation device which opened a vent pipe 73 and the liquid return tubing 75 for free passage with the communicating tube 74, connected the raffinate outflow piping 4 with the extract container 1 in the location higher than the communicating tube 74, and connected the raffinate storage container 29 with the raffinate outflow piping 4 through the check valve 80 After mixing a solvent with feed for extraction for the mixed piping 45, it leads in the extract container 1.

[0076] Moreover, also as follows, the configuration of the heat souce of the refrigerating cycle equipment shown in drawing 17 can be summarized. This heat souce Namely, a compressor 23, an oil separator 53, the heat-source side heat exchanger 25, and an accumulator 26, While having the oil returning circuit 35 which extracts from an oil separator 53 and carries out oil returning to the mixed piping 45 through a device 36, branching piping between the heat-source side heat exchanger 25 and the liquid piping 27 and connecting with the mixed piping 45 Connect the oil returning circuit 35 with the mixed piping 45, and the outlet of the mixed piping 45 and the inlet port of an accumulator 26 are connected. 1st space (up space) 26a and 2nd space (lower space) 26b by which the hierarchy division was carried out up and down in the accumulator 26 interior are prepared. The vent pipe 73 which carries out opening of the end to the upper part of 1st space 26a, and carries out opening of the other end to the pars basilaris ossis occipitalis of 1st space 26a, The liquid return tubing 75 which carries out opening of the end to the upper part of 1st space 26a, and carries out opening of the other end to 2nd space 26b, A vent pipe 73 and the liquid return tubing 75 are opened for free passage with the communicating tube 74, the raffinate outflow piping 4 is connected with 1st space 26a in a location higher than the communicating tube 74, and the raffinate storage container 29 is connected with the raffinate outflow piping 4 through a check valve 80.

[0077] Moreover, also as follows, the extraction separation device shown in drawing 18 can be summarized. That is, this extraction separation device opens space 94b wide in middle height, and makes an extract flow out of space 94b into the exterior in the extraction separation device

in which the consistency of raffinate is smaller than the consistency of an extract while it is equipped with the mixed piping 45 of the feed for extraction and the solvent which connected space 94a and space 94b in a container 1 by top hole 93a and lower hole 93b, and were connected to space 94a.

[0078] Gestalt 7. drawing 19 of operation shows the refrigerant circuit of a refrigerating cycle in which the extraction separation device by the gestalt 7 of operation of this invention was carried. In drawing 19 , the same notation is given to the same part as the gestalt 5 of operation, and explanation is omitted. In drawing 19 , 73 is a vent pipe, and it projects upward to up space 26a, and opening of the end is carried out, and the other end penetrates a dashboard 83 and it carries out opening to the lower space 26b side. 75 is refrigerant liquid return tubing, and it carries out opening of the other end to lower space 26b while it carries out opening of the end to up space 26a. The float valve 81 of the middle consistency of mineral oil and refrigerant liquid is installed in the edge by the side of up space 26a of the refrigerant liquid return tubing 75, and it exercises up and down with the amount of the refrigerant liquid in up space 26a.

[0079] Here, in the refrigerant circuit shown in drawing 19 , the actuation which separates mineral oil from the mixed oil of the mineral oil and ester oil which were collected from established piping is explained, performing air conditioning or heating operation. When the mineral oil which remained in established piping is mixed with the ester oil of the compressor 23 interior, the mixed oil of ester oil and mineral oil separated with the oil separator 53 extracts as the oil returning piping 35, flows into the mixed piping (inhalation piping) 45 of an accumulator 26 through 36, and is mixed with the mineral oil collected from established piping. Furthermore, the liquid cooling intermediation condensed by the heat-source side heat exchanger extracts, and it flows into the mixed piping (inhalation piping) 45 of the rat tail accumulator 26 to low voltage by 78, and it is mixed with said ester oil and mixed oil of mineral oil, ester oil is extracted from the mixed oil of ester oil and mineral oil by refrigerant liquid, and it flows into an accumulator 26. The demister 76 for vapor liquid separation separates into a gas refrigerant and a liquid, and the refrigerant liquid and mineral oil into which the refrigerant-gas ester oil which flowed into the accumulator 26 melted go into up space 26a by it. The gas refrigerant in up space 26a flows into lower space 26b through a vent pipe 73, flows U tube 84, and returns to a compressor 23. The liquid separated by the demister 76 for vapor liquid separation collects on the pars basilaris ossis occipitalis of up space 26a, and the refrigerant liquid into which an upper phase and ester oil melted [the mineral oil into which ester oil melted slightly] serves as a lower phase, and carries out two-phase separation of it. Here, since the consistency of a float valve 81 is heavier than mineral oil and lighter than refrigerant liquid, it floats near the interface of an upper phase and a lower phase. If the amount of the refrigerant liquid which makes a lower phase increases, a float valve 81 will go up according to the height of refrigerant liquid, the edge of the refrigerant liquid return tubing 75 will be opened, and refrigerant liquid collected on the pars basilaris ossis occipitalis of up space 26a will be poured to lower space 26b. Only the amount according to a refrigerant flow rate flows into the U tube 84 interior from the oil returning hole 77, and the liquid cooling intermediation into which ester oil collected on the pars basilaris ossis occipitalis of lower space 26b melted flows into a compressor 23 with a refrigerant gas.

[0080] Therefore, by controlling the interface of mineral oil and refrigerant liquid by the float valve 81, and returning the refrigerant liquid into which ester oil melted to a compressor through lower space 26b, it can become possible to collect mineral oil to up space 26a, and the mineral oil collected from established piping with the simple configuration can be separated and removed, and the dependability of a refrigerating cycle can be raised.

[0081] Drawing 20 shows other examples of the refrigerant circuit of a refrigerating cycle in which the extraction separation device by the gestalt 7 of operation of this invention was carried. The extraction separation device and refrigerant circuit of drawing 20 connect the raffinate outflow piping 4 with the extract container 1 in a location higher than the oil-level height of the extract further controlled by the float valve 81, and connect the raffinate outflow piping 4 and the raffinate storage container 29 to what was shown in drawing 18 through a check valve 80.

[0082] Drawing 21 shows the example of further others of the refrigerant circuit of a

refrigerating cycle in which the extraction separation device by the gestalt 7 of operation of this invention was carried. Although the example of drawing 18 showed the example which divided the accumulator 26 into two steps of upper and lower sides with the dashboard 83, the same effectiveness can be acquired also in the example shown in drawing 21 . That is, with a dashboard 83, it divides into the space 94a and 94b on either side, and the clearance 93 between upside is established in a dashboard 83. The pars basilaris ossis occipitalis of space 94a and the pars basilaris ossis occipitalis of space 94b are connected for piping 93 through the float type closing motion valve 92. By making float 91 it being larger than the consistency of mineral oil, and lighter than the consistency of refrigerant liquid, float 91 floats near the interface of mineral oil and refrigerant liquid within space 94a. Therefore, if the amount of the refrigerant liquid of the pars basilaris ossis occipitalis of space 94a increases, while float 91 will go up, only mineral oil can be accumulated in space 94a by the float type closing motion valve's 92 opening, and pouring refrigerant liquid from space 94a to space 94b through piping 93.

[0083] In addition, also as follows, the extraction separation device shown in drawing 19 can be summarized. Namely, the liquid return tubing 75 which this extraction separation device carries out opening of the end to the pars basilaris ossis occipitalis in the extract container 1, and carries out opening of the other end out of the extract container 1, The vent pipe which opens the upper part and the container exterior of the extract container 1 for free passage, and the mixed piping 45 drawn in the extract container 1 after mixing a solvent with feed for extraction, If the float valve 81 used as the consistency of raffinate and the consistency between the consistencies of an extract is formed as a switchgear of the liquid return tubing 75 and the oil-level height of the extract in the extract container 1 becomes beyond a predetermined value, a float valve 81 will be opened wide and only an extract will be discharged out of the extract container 1.

[0084] Moreover, also as follows, the extraction separation device shown in drawing 21 can be summarized. That is, it opens and closes the closing motion valve 92, and this extraction separation device connects the mutual lower part through the float type closing motion valve 92, and it moves an extract to space 94b from space 94a with float 91 while making space 94a and space 94b in a container 1 open for free passage in a top hole 93.

[0085] Gestalt 8. drawing 22 of operation shows the refrigerant circuit of a refrigerating cycle in which the extraction separation device by the gestalt 8 of operation of this invention was carried. In drawing 22 , the same notation is given to the same part as an example 5, and explanation is omitted. In drawing 22 , 73 is a vent pipe, and it projects upward to up space 26a, and opening of the end is carried out, and the other end penetrates a dashboard 83 and it carries out opening to the lower space 26b side. 87 is the refrigerant liquid siphon, 96 is a solenoid valve, and while carrying out opening of the end of the refrigerant liquid siphon 87 to the pars basilaris ossis occipitalis of up space 26a, the other end is connected with the outlet of U tube 84 through a solenoid valve 96.

[0086] Here, the actuation which separates mineral oil from the mixed oil of the mineral oil and ester oil which were collected from established piping is explained with the equipment of drawing 22 , performing air conditioning or heating operation. When the mineral oil which remained in established piping is mixed with the ester oil of the compressor 23 interior, the mixed oil of ester oil and mineral oil separated with the oil separator 53 extracts as the oil returning piping 35, flows into the mixed piping (inhalation piping) tubing 45 of an accumulator 26 through 36, and is mixed with the mineral oil collected from established piping. Furthermore, the liquid cooling intermediation condensed by the heat-source side heat exchanger 25 extracts, and it flows into the mixed piping (inhalation piping) 45 of the rat tail accumulator 26 to low voltage by 78, and it is mixed with said ester oil and mixed oil of mineral oil, ester oil is extracted from the mixed oil of ester oil and mineral oil by refrigerant liquid, and it flows into an accumulator 26. The demister 76 for vapor liquid separation separates into a gas refrigerant and a liquid, and the refrigerant liquid and mineral oil into which the refrigerant-gas ester oil which flowed into the accumulator 26 melted go into up space 26a by it. The gas refrigerant in up space 26a flows into lower space 26b through a vent pipe 73, flows U tube 84, and returns to a compressor 23. The liquid separated by the demister 76 for vapor liquid separation collects on the pars basilaris ossis

occipitalis of up space 26[illegible]d the refrigerant liquid into which an upper phase and ester oil melted [the mineral oil into which ester oil melted slightly] serves as a lower phase, and carries out two-phase separation of it. When the amount of the refrigerant liquid which makes a lower phase increases, the interface sensor 82 detects the rise of the interface of refrigerant liquid and mineral oil, and a solenoid valve 96 is opened. If a solenoid valve 96 is opened, refrigerant liquid collected on the pars basilaris ossis occipitalis of up space 26a will flow the refrigerant liquid siphon 87, and will flow into a U tube outlet through a solenoid valve 96. Moreover, when the inflow of refrigerant liquid becomes large and an interface goes up to a location in the interface sensor 88 temporarily, a solenoid valve 89 is opened and the refrigerant liquid of the pars basilaris ossis occipitalis of up space 26a is poured to lower space 26b through piping 90.
[0087] Therefore, since refrigerant liquid can be stored suitable for lower space 26b even when the amount of refrigerant liquid flow ON to an accumulator increases temporarily while raising the sharpness of separation of mineral oil by detecting the interface of mineral oil and ester oil with a sufficient precision, mineral oil can be stored certainly.
[0088] In addition, as an interface sensor, an electrostatic-capacity sensor, the thing which detects an infrared absorbance, the thing which detects the difference of the rate of optical refraction are common here.
[0089] In addition, also as follows, the extraction separation device shown in drawing 22 can be summarized. That is, this extraction separation device forms the solenoid valve 96 which attracts an extract from the refrigerant siphon 87 with the signal of the vent pipe 73 which opens the upper part of the extract container 1, and the space of the container exterior for free passage, the refrigerant liquid siphon 87, the mixed piping 45 drawn in the extract container 1 after mixing a solvent with feed for extraction, the interface sensor 82 which detects migration of the interface of raffinate and an extract, and the interface sensor 82.
[0090]
[Effect of the Invention] Since according to the extraction separation device concerning this invention the consistency of raffinate was equipped with the device in which only raffinate is separated from the consistency of an extract in a small extraction separation device while mixing the feed for extraction which solute and diluent mixed, and a solvent by the ratio which carries out two-phase separation and extracting the solute in feed for extraction to the solvent, as indicated to claim 1, solute and raffinate are certainly separable.
[0091] According to the extraction separation device concerning this invention, as indicated to claims 2 and 3 The extract container which extracts a predetermined component from feed for extraction with a solvent, and the oil-level generating container which has solvent outflow piping Since it has arranged so that the oil level formed by raffinate outflow piping rather than the oil level which is made mutually open for free passage in the lower part and the upper part of the direction of a vertical, respectively, and forms solvent outflow piping and raffinate outflow piping by solvent outflow piping may become high The location of the oil level in an extract container can be controlled simply, and raffinate can be separated effectively.
[0092] The extract container which according to the extraction separation device concerning this invention extracts a predetermined component from feed for extraction with a solvent as indicated to claim 4, Since raffinate outflow piping has been arranged so that the oil level formed by raffinate outflow piping from oil-level height in case only a solvent is in an extract container may become high including the controlling mechanism which makes regularity differential pressure of the base in an extract container, and an oil level, only raffinate is certainly separable.

[0093] The extract container which according to the extraction separation device concerning this invention extracts a predetermined component from feed for extraction with a solvent as indicated to claim 5, The oil-level generating container of each other equipped with solvent inflow piping and solvent outflow piping was made to open for free passage in the lower part and the upper part of the direction of a vertical, respectively, and it has arranged so that the oil level formed by raffinate outflow piping rather than the oil level which forms solvent outflow piping and raffinate outflow piping by solvent outflow piping may become high. That is, since inflow piping for which vapor-liquid two-phases flow is made to flow into an oil-level generating container, and

outflow piping into which v[illegible]-liquid two-phases flow is made to flow can be prepared and an oil level can be generated near the end connection of outflow piping and an oil-level generating container, the oil level in an extract container can be controlled with a sufficient precision, it can have, and an extract and raffinate can be separated effectively.

[0094] According to the extraction separation device concerning this invention, even when the amount of raffinate is a small amount in an extract container since the horizontal cross section near the connection of raffinate outflow piping was made smaller than the horizontal cross section of a part low near the connection as indicated to claim 6, raffinate can be separated certainly.

[0095] According to the extraction separation device concerning this invention, as indicated to claims 7 and 8 The extract container which connects with mixed piping which mixes a solvent with feed for extraction, and said mixed piping, connects raffinate outflow piping to the upper part, and connects extract outflow piping to the lower part, Since a means to control the oil-level height of the raffinate in said extract container in a location higher than the lower part of the end connection of said raffinate outflow piping and said extract container was established, a solvent can be efficiently mixed with feed for extraction, and raffinate can be separated certainly.

[0096] Mixed piping which according to the extraction separation device concerning this invention mixes a solvent with feed for extraction as indicated to claim 9, The extract container which connects with said mixed piping, connects raffinate outflow piping to the upper part, and connects extract outflow piping to the lower part, Since a means to control the interface height of the raffinate in said extract container and an extract in a location higher than the connection of said extract outflow piping and said extract container was established Since another container which can store raffinate certainly in an extract container, and stores raffinate is not needed, equipment can be manufactured cheaply.

[0097] According to the extraction separation device concerning this invention, as indicated to claim 10 The extract container which connects with mixed piping which mixes a solvent with feed for extraction, and said mixed piping, connects raffinate outflow piping to the upper part, and connects extract outflow piping to the lower part, While controlling the oil-level height of the raffinate in said extract container in a location higher than the lower part of the end connection of said raffinate outflow piping and said extract container Since a means to control the interface height of raffinate and an extract in a location higher than the end connection of said extract outflow piping and said extract container was established While being able to store raffinate certainly in an extract container, even when the inflow of the extract to an extract container increases temporarily, it is stabilized and the location of the raffinate side in an extract container and the interface of raffinate and refrigerant liquid can be controlled.

[0098] According to the heat souce of the refrigerating cycle equipment concerning this invention, as indicated to claim 11 Have an extraction separation device according to claim 1 to 4, and the lower stream of a river of a heat-source side heat exchanger and solvent inflow piping of an extraction separation device are connected. Since the lower part and feed-for-extraction inflow piping of an accumulator were connected and inhalation piping of a compressor and solvent outflow piping of an oil-level generator were connected Even when the refrigerating machine oil corresponding to a HFC system refrigerant, such as ester oil and an ether oil, is mixed to the mineral oil collected out of established piping, separation recovery of the mineral oil can be carried out.

[0099] According to the heat souce of the refrigerating cycle equipment concerning this invention, as indicated to claim 12 It has the oil separator connected to the discharge side of a compressor, and an extraction separation device according to claim 1 to 4. While extracting the lower stream of a river of an oil separator, and solvent inflow piping of an extraction separation device, connecting through a means and connecting the lower part and feed-for-extraction inflow piping of an accumulator Since it had the refrigerant heat exchanger to which inhalation piping and solvent outflow piping of a compressor are connected to, and it extracts from the lower stream of a river of an oil separator, and heat exchange of piping between means and the piping between inhalation piping of a compressor and solvent outflow piping is carried out Even

when the refrigerating machine oil corresponding to a HFC system refrigerant, such as ester oil and an ether oil, is mixed to the mineral oil collected out of established piping, separation recovery of the mineral oil can be carried out.

[0100] According to the heat souce of the refrigerating cycle equipment concerning this invention, as indicated to claim 13 Have an extraction separation device according to claim 5 or 6, and the lower stream of a river of a heat-source side heat exchanger and solvent inflow piping of an extraction separation device are connected. Since the lower part and feed-for-extraction inflow piping of an accumulator were connected, inhalation piping and solvent outflow piping of a compressor were connected and inhalation piping and extract outflow piping of a compressor were connected Even when the refrigerating machine oil corresponding to a HFC system refrigerant, such as ester oil and an ether oil, is mixed to the mineral oil collected out of established piping, separation recovery of the mineral oil can be carried out.

[0101] According to the heat souce of the refrigerating cycle equipment concerning this invention, as indicated to claim 14 It has an extraction separation device according to claim 5 or 6 including the oil separator connected to the discharge side of compressor. Since connected the lower stream of a river of a heat-source side heat exchanger, and solvent inflow piping of an extraction separation device, the oil returning circuit and feed-for-extraction inflow piping of an oil separator were connected, inhalation piping and solvent outflow piping of a compressor were connected and inhalation piping and extract outflow piping of a compressor were connected The mineral oil collected out of established piping by all operating ranges is separable.

[0102] According to the heat souce of the refrigerating cycle equipment concerning this invention, as indicated to claim 15 It has an extraction separation device according to claim 7 to 10 including the oil separator connected to the discharge side of compressor. After connecting the lower stream of a river of a heat-source side heat exchanger, and the mixer tube of an extraction separation device, connecting the oil returning circuit and the mixer tube of an oil separator, connecting the other end of liquid return tubing to piping or the device of the low-tension side and mixing a solvent with feed for extraction for mixed piping beforehand, it is made to flow into an extract container. Thereby, since the extract of solute can be ensured, even when the refrigerating machine oil corresponding to a HFC system refrigerant, such as ester oil and an ether oil, is mixed to the mineral oil collected from established piping in a refrigerating cycle, mineral oil can be separated certainly efficiently.

[0103] As indicated to claim 16, after connecting the lower stream of a river of a heat-source side heat exchanger, and mixed piping of an extraction separation device, connecting the oil returning circuit and mixed piping of an oil separator including the oil separator connected to the discharge side of a compressor, and an one apparatus accumulator according to claim 8 and mixing a solvent with feed for extraction for mixed piping beforehand, it is made to flow into an extract container according to the heat souce of the refrigerating cycle equipment concerning this invention. Therefore, since an extract container is built in in an accumulator, even when the refrigerating machine oil corresponding to a HFC system refrigerant, such as ester oil and an ether oil, is mixed to the mineral oil collected from established piping in a refrigerating cycle, mineral oil can be separated efficiently cheaply.

[0104] Since according to the heat souce of the refrigerating cycle equipment concerning this invention the device in which it prevented that the liquid in a raffinate reservoir container flows backwards to the exterior in a raffinate reservoir container was established as indicated to claim 17, the mineral oil stored in the raffinate reservoir container prevents re-flowing out in a refrigerant circuit.

[0105] Since according to the heat souce of the refrigerating cycle equipment concerning this invention the adsorption material which adsorbs raffinate was prepared in the interior of a raffinate reservoir container as indicated to claim 18, the mineral oil stored in the raffinate reservoir container can be captured certainly simply.

[0106] Since according to the heat souce of the refrigerating cycle equipment concerning this invention it considered as the refrigerant of a hydro fluorocarbon system as a solvent and considered as the mixed oil of either either ester oil or an ether oil mineral oil or a hard alkylbenzene oil as feed for extraction as indicated to claim 19, the recovery effectiveness of

ester oil is raised, it can prevent that the lubricating oil of a compressor is drained, and dependability can be raised.
[0107] Since according to the heat souce of the refrigerating cycle equipment concerning this invention temperature in an extract container was made below into the saturation temperature of the low voltage of a refrigerating cycle as indicated to claim 20, mineral oil can be extracted with a more sufficient precision.
[0108] Since according to the refrigerating cycle equipment concerning this invention the use side machine containing a use side heat exchanger and heat souce according to claim 11 to 20 were connected by connecting piping and the refrigerant circuit was constituted as indicated to claim 21, the refrigerating cycle equipment which can separate solute from feed for extraction is obtained.
[0109] Since according to the refrigerating cycle equipment concerning this invention the connecting piping of established refrigerating cycle equipment was used as connecting piping as indicated to claim 22, the refrigerating cycle equipment updated efficiently is obtained.
[0110] Since according to the updating approach of the refrigerating cycle equipment concerning this invention a refrigerant is permuted while permuting the heat souce of established refrigerating cycle equipment by heat souce according to claim 11 to 20 as indicated to claim 23, it can update using the connecting piping of established refrigerating cycle equipment etc.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the refrigerant circuit Fig. of a refrigerating cycle in which the extraction separation device of the gestalt 1 of operation of this invention was carried.
[Drawing 2] It is the outline block diagram of the extraction separation device of the gestalt 1 of operation of this invention.
[Drawing 3] It is the mimetic diagram showing the oil-level level in an extract container and an oil-level generating container.
[Drawing 4] It is drawing showing change of the difference of the oil-level level of the extract container to change of the ratio of the mineral oil in an extract container, and an oil-level generating container.
[Drawing 5] It is drawing showing the phase condition of the liquid phase 3 component system using a triangular coordinate.
[Drawing 6] It is drawing showing the equilibrium curve of a liquid phase 3 component system.
[Drawing 7] They are other outline block diagrams of the extraction separation device of the gestalt 1 of operation of this invention.
[Drawing 8] It is drawing showing the phase condition of the liquid phase 3 component system using the triangular coordinate in other examples of the extraction separation device of the gestalt 1 of operation of this invention.
[Drawing 9] It is the refrigerant circuit Fig. showing the example of others of a refrigerating cycle

which carried the extraction separation device of the gestalt 1 of operation of this invention.
[Drawing 10] It is the outline block diagram of the extraction separation device of the gestalt 2 of operation of this invention.
[Drawing 11] It is the outline block diagram of the extraction separation device of the gestalt 3 of operation of this invention.
[Drawing 12] It is the outline block diagram of the extraction separation device of the gestalt 4 of operation of this invention.
[Drawing 13] It is drawing showing the refrigerant circuit Fig. of a refrigerating cycle in which the extraction separation device of the gestalt 5 of operation of this invention was carried.
[Drawing 14] It is the outline block diagram of the extraction separation device of the gestalt 5 of operation of this invention.
[Drawing 15] They are other outline block diagrams of the extraction separation device of the gestalt 5 of operation of this invention.
[Drawing 16] It is drawing showing other examples of the refrigerant circuit Fig. of the refrigerating cycle which carried the extraction separation device of the gestalt 5 of operation of this invention.
[Drawing 17] It is the refrigerant circuit Fig. showing the example of others of a refrigerating cycle which carried the extraction separation device of the gestalt 6 of operation of this invention.
[Drawing 18] It is drawing showing the refrigerant circuit Fig. of a refrigerating cycle in which the extraction separation device of the gestalt 6 of operation of this invention was carried.
[Drawing 19] It is the refrigerant circuit Fig. showing the example of others of a refrigerating cycle which carried the extraction separation device of the gestalt 7 of operation of this invention.
[Drawing 20] It is drawing showing the refrigerant circuit Fig. of a refrigerating cycle in which the extraction separation device of the gestalt 7 of operation of this invention was carried.
[Drawing 21] It is drawing showing the refrigerant circuit Fig. of a refrigerating cycle in which the extraction separation device of the gestalt 7 of operation of this invention was carried.
[Drawing 22] It is drawing showing the refrigerant circuit Fig. of a refrigerating cycle in which the extraction separation device of the gestalt 8 of operation of this invention was carried.
[Drawing 23] It is the outline block diagram of the extraction separation device of the conventional example.
[Drawing 24] It is the outline block diagram of the extraction separation device of other conventional examples.
[Description of Notations]
1 Extract Container 2 Feed-for-Extraction Inflow Piping 3 Solvent Inflow Piping, 4 Raffinate outflow piping 5 Extract outflow piping 6 Oil-level generating container, 7 Outflow piping 8 Up crossfire tube 9 Lower crossfire tube, 10 Shell 11, 12, 13 A dashboard, 14, 15, 16, 17 Hole, 20 Outer cylinder form container 21 An inner cylinder form container, 22 Inflow piping, 23 Compressor 24 Four way valve 25 Heat-source side heat exchanger, 26 Accumulator 26a Up space 26b Lower space, 27 liquid Rhine piping 28 Refrigerant heat exchanger 29 Raffinate reservoir container, 30 Piping 30a Inhalation piping 31 32 Valve, 33 Piping 34 Valve Oil returning circuit 36 Collimator, 37 Gas pipe 38 Liquid tube 39 Load side heat exchanger, 40 collimator 41, 42, 43, 44 Space 45 Mixed piping (inhalation piping), 51 Exterior unit 52 Interior unit 53 Oil separator, 54 oil-returning hole 55 Foreign matter capture means 56 57 Actuation valve, 58 An collimator, 61 Machine section 62 Countershaft carrier 63 Oil feeder, 64 Feed pipe 65 floats 66 Extract opening 67 Extract piping, 68 Liquefied refrigerant which uses HFC as a principal component 69 A spring, 70 Sealing casing, 71 Immiscible nature lubricating oil 72 Refrigerant circuit 73 Vent pipe, 74 Communicating tube 75 Refrigerant liquid return tubing 76 The demister for vapor liquid separation, 77 Oil returning hole 78 It extracts. 79 It extracts. 80 Check valve, 81 Float valve 82 Interface sensor 83 Dashboard, 84 U tube 85 Back pressure tubing 86 Piping 87 Refrigerant liquid siphon, 88 Interface sensor 89 Solenoid valve 90 Piping 91 Float 92 float type closing motion valve 93 Piping 94 Space 96 Solenoid valve.

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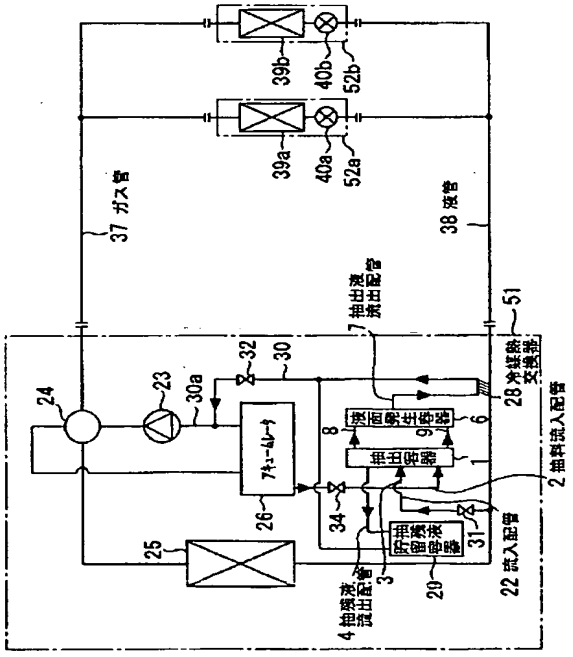
(71)出願人　000006013
三菱電機株式会社
東京都千代田区丸の内二丁目２番３号
(72)発明者　森本　修
東京都千代田区丸の内二丁目２番３号　三菱電機株式会社内
(72)発明者　平井　康順
東京都千代田区丸の内二丁目２番３号　三菱電機株式会社内
(74)代理人　100082175
弁理士　高田　守　（外３名）

最終頁に続く

(54)【発明の名称】　抽出分離機構、冷凍サイクル装置の熱源機、冷凍サイクル装置および冷凍サイクル装置の更新方法

(57)【要約】
【課題】　圧縮機に液冷媒が寝込んだ状態で圧縮機を起動すると、フォーミングによって圧縮機内の冷凍機油が一時的に多量に流出するため、高性能な油分離器でも全ての冷凍機油を捕らえきれない可能性がある。この場合、一旦、室外機から新規の油が流出してしまうと、既設配管中から回収した鉱油とエステル油もしくはエーテル油が混ざり、エステル油もしくはエーテル油のみを分離し圧縮機へ返油することが不可能になるので、圧縮機の油が枯渇し、信頼性を失う可能性があった。
【解決手段】　圧縮機、熱源側熱交換器およびアキュムレータを備え、前記熱源側熱交換器と液配管との間の配管と流入配管とを接続した抽出分離機構と、前記アキュムレータの下部と抽料流入配管とを接続する配管と、前記圧縮機吸入配管を分岐し流出配管と接続する配管と、前記圧縮機吸入配管を分岐し抽出液流出配管と接続する配管と、抽残液流出配管と接続され抽残液を貯留する抽残液貯留容器を有するものである。



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【特許請求の範囲】

【請求項１】　抽質と原溶媒とが混合した抽料と抽剤とを二相分離する比率で混合し、抽料中の抽質を抽剤に抽出すると共に抽残液の密度が抽出液の密度よりも小さい抽出分離機構において、抽残液のみを分離する機構を備えたことを特徴とする抽出分離機構。

【請求項２】　鉛直方向に長さを有し、抽剤流入配管、抽料流入配管、前記抽剤流入配管および前記抽料流入配管より高い位置に配置された抽残液流出配管を備え、抽剤により抽料から所定成分を抽出する抽出容器と、鉛直方向に長さを有し抽剤流出配管を有する液面発生容器とを、それぞれ鉛直方向の下部および上部で互いに連通させ、前記抽剤流出配管と前記抽残液流出配管とを前記抽剤流出配管により形成する液面よりも前記抽残液流出配管により形成する液面が高くなるように配置したことを特徴とする抽出分離機構。

【請求項３】　前記抽料流入配管を前記抽剤流入配管よりも低い位置に配置したことを特徴とする請求項２に記載の抽出分離機構。

【請求項４】　鉛直方向に長さを有し、抽剤流入配管と抽料流入配管と前記抽剤流入配管および前記抽料流入配管より高い位置に配置された抽残液流出配管と、前記抽料流入配管より低い位置に配置された抽出液流出配管とを備え、抽剤により抽料から所定成分を抽出する抽出容器と、前記抽出容器内の底面と液面との圧力差を一定にする制御機構とを含み、前記抽出容器内に抽剤のみがある場合の液面高さより前記抽残液流出配管により形成する液面が高くなるように前記抽残液流出配管を配置したことを特徴とする抽出分離機構。

【請求項５】　鉛直方向に長さを有し、抽料流入配管と、前記抽料流入配管より高い位置に配置された抽残液流出配管と、前記抽料流入配管より低い位置に配置された抽出液流出配管とを備え、抽剤により抽料から所定成分を抽出する抽出容器と、鉛直方向に長さを有し、抽剤流入配管と抽剤流出配管とを備えた液面発生容器とを、それぞれ鉛直方向の下部および上部で互いに連通させ、前記抽剤流出配管と前記抽残液流出配管とを前記抽剤流出配管により形成する液面よりも前記抽残液流出配管により形成する液面が高くなるように配置したことを特徴とする抽出分離機構。

【請求項６】　前記抽出容器において、前記抽残液流出配管の接続部近傍の水平方向の断面積を前記接続部近傍より低い部分の水平方向の断面積よりも小さくしたことを特徴とする請求項２～５のいずれかに記載の抽出分離機構。

【請求項７】　抽剤により抽料から所定成分を抽出する抽出容器、前記抽出容器に接続され抽剤と抽料とを混合して流入させる混合配管、前記抽出容器に接続され逆止弁を有する抽残液流出配管、前記抽出容器内の下部に一端を開口し上部に他端を開口する通気管、抽出容器内の

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上部に一端を開口し前記抽出容器の外部に他端を開口する液戻し管、前記抽残液流出配管の接続部より低い位置で前記通気管の中間部と前記液戻し管の中間部とを連通する連通管を備えたことを特徴とする抽出分離機構。

【請求項８】　アキュムレータと請求項７に記載の抽出容器とを一体に形成し、前記液戻し管の前記他端を前記アキュムレータの内部に開口させたことを特徴とする一体型抽出分離機構。

【請求項９】　抽剤により抽料から所定成分を抽出する抽出容器、前記抽出容器に接続され抽剤と抽料とを混合して流入させる混合配管、前記抽出容器内の上部に一端を開口し前記抽出容器の外部に他端を開口する通気管、前記抽出容器内の下部（底部）に一端を開口し前記抽出容器の外部に他端を開口する液戻し管、抽残液の密度と抽出液の密度との中間の密度を有し前記液戻し管の前記一端を開閉するフロート弁を備えたことを特徴とする抽出分離機構。

【請求項１０】　逆止弁を有し、前記フロート弁により制御される抽出液の液面高さよりも高い位置で前記抽出容器に接続された抽残液流出配管を備えたことを特徴とする請求項９に記載の抽出分離機構。

【請求項１１】　圧縮機、熱源側熱交換器およびアキュムレータを含む冷凍サイクル装置の熱源機において、請求項１～４のいずれかに記載の抽出分離機構と、抽残液貯留容器とを備え、

前記熱源側熱交換器の下流と前記抽出分離機構の抽剤流入配管とを接続し、前記アキュムレータの下部と前記抽料流入配管とを接続し、前記圧縮機の吸入配管と前記液面発生器の抽剤流出配管とを接続し、前記抽残液流出配管と抽残液貯溜容器とを接続したことを特徴とする冷凍サイクル装置の熱源機。

【請求項１２】　圧縮機、熱源側熱交換器、アキュムレータ、前記圧縮機の吐出側に接続された油分離器を含む冷凍サイクル装置の熱源機において、請求項１～４のいずれかに記載の抽出分離機構と、抽残液貯留容器とを備え、

前記油分離器の下流と前記抽出分離機構の抽剤流入配管とを絞り手段を介して接続し、前記アキュムレータの下部と前記抽料流入配管とを接続すると共に、前記圧縮機の吸入配管と前記抽剤流出配管とを接続し、かつ、前記油分離器の下流から前記絞り手段の間の配管と、前記圧縮機の吸入配管と前記抽剤流出配管の間の配管を熱交換させる冷媒熱交換器を備え、前記抽残液流出配管と前記抽残液貯溜容器とを接続したことを特徴とする冷凍サイクル装置の熱源機。

【請求項１３】　圧縮機、熱源側熱交換器およびアキュムレータを含む冷凍サイクル装置の熱源機において、請求項５または６に記載の抽出分離機構と、抽残液貯留容器とを備え、

前記熱源側熱交換器の下流と前記抽出分離機構の抽剤流

入配管とを接続し、前記アキュムレータの下部と前記抽料流入配管とを接続し、前記圧縮機の吸入配管と前記抽剤流出配管とを接続し、前記圧縮機の吸入配管と前記抽出液流出配管とを接続し、前記抽残液流出配管と抽残液貯溜容器とを接続したことを特徴とする冷凍サイクル装置の熱源機。

【請求項１４】　圧縮機、熱源側熱交換器、アキュムレータ、前記圧縮機の吐出側に接続された油分離器を含む冷凍サイクル装置の熱源機において、請求項５または６に記載の抽出分離機構と、抽残液貯留容器とを備え、

前記熱源側熱交換器の下流と前記抽出分離機構の抽剤流入配管とを接続し、前記油分離器の返油回路と前記抽料流入配管とを接続し、前記圧縮機の吸入配管と前記抽剤流出配管とを接続し、前記圧縮機の吸入配管と前記抽出液流出配管とを接続し、前記抽残液流出配管と抽残液貯溜容器とを接続したことを特徴とする冷凍サイクル装置の熱源機。

【請求項１５】　圧縮機、熱源側熱交換器、アキュムレータ、前記圧縮機の吐出側に接続された油分離器を含む冷凍サイクル装置の熱源機において、請求項７～１０のいずれかに記載の抽出分離機構と、抽残液貯留容器とを備え、

前記熱源側熱交換器の下流と前記抽出分離機構の混合配管とを接続し、前記油分離器の返油回路と前記混合配管とを接続し、前記液戻し管の前記他端を低圧側の配管もしくは機器に接続し、前記抽残液流出配管と前記抽残液貯溜容器とを接続したことを特徴とする冷凍サイクル装置の熱源機。

【請求項１６】　圧縮機、熱源側熱交換器、請求項８に記載の一体型アキュムレータ、前記圧縮機の吐出側に接続された油分離器を含む冷凍サイクル装置の熱源機において、抽残液貯留容器を備え、

前記熱源側熱交換器の下流と前記抽出分離機構の混合管とを接続し、前記油分離器の返油回路と前記混合管とを接続し、前記抽残液流出配管と前記抽残液貯溜容器とを接続したことを特徴とする冷凍サイクル装置の熱源機。

【請求項１７】　前記抽残液貯溜容器には、抽残液貯溜容器内の液が外部へ逆流することを防止する機構を設けたことを特徴とする請求項１１～１６のいずれかに記載の冷凍サイクル装置の熱源機。

【請求項１８】　前記抽残液貯溜容器内部には抽残液もしくは原溶媒を吸着する吸着材を設けたことを特徴とする請求項１１～１７のいずれかに記載の冷凍サイクル装置の熱源機。

【請求項１９】　前記抽剤としてハイドロフルオロカーボン系の冷媒、前記抽料としてエステル油もしくはエーテル油のいずれかと鉱油もしくはハードアルキルベンゼン油のいずれかとの混合油としたことを特徴とする請求項１１～１８のいずかに記載の冷凍サイクル装置の熱源機。

【請求項２０】　前記抽出容器内の温度は、冷凍サイクルの低圧の飽和温度とすることを特徴とする請求項１１～１９のいずれかに記載の冷凍サイクル装置の熱源機。

【請求項２１】　利用側熱交換器を含む利用側機と、請求項１１～２０のいずれかに記載の熱源機とを接続配管により接続して冷媒回路を構成したことを特徴とする冷凍サイクル装置。

【請求項２２】　前記接続配管として、既設の冷凍サイクル装置の接続配管を利用したことを特徴とする請求項２１に記載の冷凍サイクル装置。

【請求項２３】　既設の冷凍サイクル装置の熱源機を請求項１１～２０のいずれかに記載の熱源機に置換するとともに冷媒を置換することを特徴とする冷凍サイクル装置の更新方法。

【発明の詳細な説明】

【０００１】

【産業上の技術分野】この発明は冷凍サイクル装置あるいは空調・冷凍装置の冷媒の置換に関する。さらに詳しくは、冷凍サイクル装置の冷媒を置換する際に既存の冷凍機油を抽出分離する抽出分離機構とそれを用いた冷凍サイクル装置に関する。具体例としては、主に、HFC系冷媒を用いた冷凍・空調機を新設する場合において、HCFC系冷媒もしくはCFC系冷媒を用いた冷凍空調機に用いられていた既設の延長配管を流用する場合、既設配管中に残留するHCFC系もしくはCFC系冷媒用の冷凍機油を洗浄・回収する抽出分離機構および抽出分離機構を有する冷凍・空調機に関するものである。

【０００２】

【従来の技術】図２３は、特開2000－9368号公報に記載の既設配管を用いた冷凍・空調機であって、既設配管中に残留する鉱油を洗浄・回収する冷凍サイクル装置の従来例である。図２３に示す冷凍サイクルにおいて、冷房運転を行う場合は、圧縮機２３で圧縮された高温高圧のガス冷媒はＨＦＣ用冷凍機油と共に圧縮機２３を吐出され、油分離器５３に入る。ここで、ＨＦＣ用の冷凍機油は完全に分離され、ガス冷媒のみが、四方弁２４を経て、熱源側熱交換器２５へ流入し、凝縮液化する。凝縮液化した冷媒は第一の操作弁５７を経て第一の接続配管Ｃを流れる。ＨＦＣの液冷媒が第一の接続配管Ｃを流れるときに、第一の接続配管Ｃに残留している鉱油等を少しずつ洗浄してＨＦＣの液冷媒と共に流れ、絞り装置４０へ流入し、ここで、低圧まで減圧されて低温の二相状態となり、負荷側熱交換器３９で蒸発・ガス化する。蒸発・ガス化した冷媒は、第二の接続配管Ｄに流入する。第二の接続配管Ｄに流入している鉱油は、ガス冷媒との速度差から生じる鉱油と冷媒ガス界面のせん断力を推進力とし、配管内面を引きずられるように流れる。接続配管Ｄを流れた鉱油を含むガス冷媒は、四方弁２４を介して異物捕獲手段５５へ流入する。ここで、鉱油はガス冷媒から分離され、ガス冷媒のみがアキュムレータ２６を

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介して圧縮機２３へ戻る。

【０００３】また、図２４は特開平09－324756号公報に記載の密閉型圧縮機で、液面を制御して冷凍機油と液冷媒を分離する機構の従来例である。密閉ケーシング７０の底面と同じ高さに抽出口６６を設け、密閉ケーシング７０の上部と底面と密閉ケーシング７０の底面と同じ高さに設けた抽出口６６とを抽出配管６７で結び、その抽出配管６７の中にＨＦＣを主成分とする液状の冷媒６８の液面と連動して動く比重を有するフロート６５を設けることで、密閉ケーシング７０内の底面から、二相分離した液冷媒を抽出し、非溶解性潤滑油７１を給油管６４より吸入するようにしたものである。

【０００４】

【発明が解決しようとする課題】特開2000－9368号公報記載の冷凍サイクル装置では、室外機の中で新規の冷凍機油として用いられるエステル油もしくはエーテル油を完全に回収する必要があり、高性能な油分離器が必要となり、構造が複雑になったり、製造にコストがかかるという課題があった。

【０００５】さらに、圧縮機に液冷媒が寝込んだ状態で圧縮機を起動すると、フォーミングによって圧縮機内の冷凍機油が一時的に多量に流出するため、高性能な油分離器でも全ての冷凍機油を捕らえきれない可能性がある。この場合、一旦、室外機から新規の油が流出してしまうと、既設配管中から回収した鉱油とエステル油もしくはエーテル油が混ざり、エステル油もしくはエーテル油のみを分離し圧縮機へ返油することが不可能になるので、圧縮機の油が枯渇し、信頼性を失う可能性があった。

【０００６】また、特開平09－324756号公報に示されるような抽出機構では、新規の冷凍機油として用いられるエステル油もしくはエーテル油と既設配管中に残留した冷凍機油である鉱油とが混合した混合油が二相分離し冷媒液の上に浮く場合には、既設配管中に残留していた冷凍機油のみを分離・回収することができず、新規のエステル油もしくはエーテル油が劣化した鉱油の影響で劣化し、信頼性を失うという課題があった。

【０００７】この発明は上述の課題を解決するためになされたものであり、第一の冷媒、例えばHCFC系もしくはCFC系冷媒が用いられていた既設配管を流用する冷凍サイクル装置あるいは冷凍・空調装置において、第二の冷媒、例えばＨＦＣ系冷媒の冷凍機油である新規のエステル油やエーテル油等と既設配管中に残留していたＣＦＣ系もしくはＨＣＦＣ系冷凍サイクルの冷凍機油である鉱油とが混合した場合でも、冷凍・空調機が通常の運転をしつつ、既設配管中に残留していた鉱油を分離回収し、新規のエステル油もしくはエーテル油の劣化を抑え、既設配管を使用する冷凍・空調機の施工を容易にし、冷凍サイクルの信頼性を高めることを目的とする。

【０００８】

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【課題を解決するための手段】本願発明による抽出分離機構は、請求項１に記載のように、抽質と原溶媒とが混合した抽料と抽剤とを二相分離する比率で混合し、抽料中の抽質を抽剤に抽出すると共に抽残液の密度が抽出液の密度よりも小さい抽出分離機構において、抽残液のみを分離する機構を備えたものである。

【０００９】本願発明による抽出分離機構は、請求項２に記載のように、鉛直方向に長さを有し、抽剤流入配管、抽料流入配管、前記抽剤流入配管および前記抽料流入配管より高い位置に配置された抽残液流出配管を備え、抽剤により抽料から所定成分を抽出する抽出容器と、鉛直方向に長さを有し抽剤流出配管を有する液面発生容器とを、それぞれ鉛直方向の下部および上部で互いに連通させ、前記抽剤流出配管と前記抽残液流出配管とを前記抽剤流出配管により形成する液面よりも前記抽残液流出配管により形成する液面が高くなるように配置したものである。

【００１０】本願発明による抽出分離機構は、請求項３に記載のように、請求項２に記載のものにおいて、前記抽料流入配管を前記抽剤流入配管よりも低い位置に配置したものである。

【００１１】本願発明による抽出分離機構は、請求項４に記載のように、鉛直方向に長さを有し、抽剤流入配管と抽料流入配管と前記抽剤流入配管および前記抽料流入配管より高い位置に配置された抽残液流出配管と、前記抽料流入配管より低い位置に配置された抽出液流出配管とを備え、抽剤により抽料から所定成分を抽出する抽出容器と、前記抽出容器内の底面と液面との圧力差を一定にする制御機構とを含み、前記抽出容器内に抽剤のみがある場合の液面高さより前記抽残液流出配管により形成する液面が高くなるように前記抽残液流出配管を配置したものである。

【００１２】本願発明による抽出分離機構は、請求項５に記載のように、鉛直方向に長さを有し、抽料流入配管と、前記抽料流入配管より高い位置に配置された抽残液流出配管と、前記抽料流入配管より低い位置に配置された抽出液流出配管とを備え、抽剤により抽料から所定成分を抽出する抽出容器と、鉛直方向に長さを有し、抽剤流入配管と抽剤流出配管とを備えた液面発生容器とを、それぞれ鉛直方向の下部および上部で互いに連通させ、前記抽剤流出配管と前記抽残液流出配管とを前記抽剤流出配管により形成する液面よりも前記抽残液流出配管により形成する液面が高くなるように配置したものである。

【００１３】本願発明による抽出分離機構は、請求項６に記載のように、請求項２～５のいずれかに記載のものにおいて、前記抽残液流出配管の接続部近傍の水平方向の断面積を前記接続部近傍より低い部分の水平方向の断面積よりも小さくしたものである。

【００１４】本願発明による抽出分離機構は、請求項７

に記載のように、抽剤により抽料から所定成分を抽出する抽出容器、前記抽出容器に接続され抽剤と抽料とを混合して流入させる混合配管、前記抽出容器に接続され逆止弁を有する抽残液流出配管、前記抽出容器内の下部に一端を開口し上部に他端を開口する通気管、抽出容器内の上部に一端を開口し前記抽出容器の外部に他端を開口する液戻し管、前記抽残液流出配管の接続部より低い位置で前記通気管の中間部と前記液戻し管の中間部とを連通する連通管を備えたものである。

【００１５】本願発明による抽出分離機構は、請求項８に記載のように、アキュムレータと請求項７に記載の抽出容器とを一体に形成し、前記液戻し管の前記他端を前記アキュムレータの内部に開口させたものである。

【００１６】本願発明による抽出分離機構は、請求項９に記載のように、抽剤により抽料から所定成分を抽出する抽出容器、前記抽出容器に接続され抽剤と抽料とを混合して流入させる混合配管、前記抽出容器内の上部に一端を開口し前記抽出容器の外部に他端を開口する通気管、前記抽出容器内の下部（底部）に一端を開口し前記抽出容器の外部に他端を開口する液戻し管、抽残液の密度と抽出液の密度との中間の密度を有し前記液戻し管の前記一端を開閉するフロート弁を備えたものである。

【００１７】本願発明による抽出分離機構は、請求項１０に記載のように、請求項９に記載のものにおいて、逆止弁を有し、前記フロート弁により制御される抽出液の液面高さよりも高い位置で前記抽出容器に接続された抽残液流出配管を備えたものである。

【００１８】本願発明による冷凍サイクル装置の熱源機は、請求項１１に記載のように、圧縮機、熱源側熱交換器およびアキュムレータを含む冷凍サイクル装置の熱源機において、請求項１～４のいずれかに記載の抽出分離機構と、抽残液貯留容器とを備え、前記熱源側熱交換器の下流と前記抽出分離機構の抽剤流入配管とを接続し、前記アキュムレータの下部と前記抽料流入配管とを接続し、前記圧縮機の吸入配管と前記液面発生器の抽剤流出配管とを接続し、前記抽残液流出配管と抽残液貯溜容器とを接続したものである。

【００１９】本願発明による冷凍サイクル装置の熱源機は、請求項１２に記載のように、圧縮機、熱源側熱交換器、アキュムレータ、前記圧縮機の吐出側に接続された油分離器を含む冷凍サイクル装置の熱源機において、請求項１～４のいずれかに記載の抽出分離機構と、抽残液貯留容器とを備え、前記油分離器の下流と前記抽出分離機構の抽剤流入配管とを絞り手段を介して接続し、前記アキュムレータの下部と前記抽料流入配管とを接続すると共に、前記圧縮機の吸入配管と前記抽剤流出配管とを接続し、かつ、前記油分離器の下流から前記絞り手段の間の配管と、前記圧縮機の吸入配管と前記抽剤流出配管の間の配管を熱交換させる冷媒熱交換器を備え、前記抽残液流出配管と前記抽残液貯溜容器とを接続したものである。

【００２０】本願発明による冷凍サイクル装置の熱源機は、請求項１３に記載のように、圧縮機、熱源側熱交換器およびアキュムレータを含む冷凍サイクル装置の熱源機において、請求項５または６に記載の抽出分離機構と、抽残液貯留容器とを備え、前記熱源側熱交換器の下流と前記抽出分離機構の抽剤流入配管とを接続し、前記アキュムレータの下部と前記抽料流入配管とを接続し、前記圧縮機の吸入配管と前記抽剤流出配管とを接続し、前記圧縮機の吸入配管と前記抽出液流出配管とを接続し、前記抽残液流出配管と抽残液貯溜容器とを接続したものである。

【００２１】本願発明による冷凍サイクル装置の熱源機は、請求項１４に記載のように、圧縮機、熱源側熱交換器、アキュムレータ、前記圧縮機の吐出側に接続された油分離器を含む冷凍サイクル装置の熱源機において、請求項５または６に記載の抽出分離機構と、抽残液貯留容器とを備え、前記熱源側熱交換器の下流と前記抽出分離機構の抽剤流入配管とを接続し、前記油分離器の返油回路と前記抽料流入配管とを接続し、前記圧縮機の吸入配管と前記抽剤流出配管とを接続し、前記圧縮機の吸入配管と前記抽出液流出配管とを接続し、前記抽残液流出配管と抽残液貯溜容器とを接続したものである。

【００２２】本願発明による冷凍サイクル装置の熱源機は、請求項１５に記載のように、圧縮機、熱源側熱交換器、アキュムレータ、前記圧縮機の吐出側に接続された油分離器を含む冷凍サイクル装置の熱源機において、請求項７～１０のいずれかに記載の抽出分離機構と、抽残液貯留容器とを備え、前記熱源側熱交換器の下流と前記抽出分離機構の混合配管とを接続し、前記油分離器の返油回路と前記混合配管とを接続し、前記液戻し管の前記他端を低圧側の配管もしくは機器に接続し、前記抽残液流出配管と前記抽残液貯溜容器とを接続したものである。

【００２３】本願発明による冷凍サイクル装置の熱源機は、請求項１６に記載のように、圧縮機、熱源側熱交換器、請求項８に記載の一体型アキュムレータ、前記圧縮機の吐出側に接続された油分離器を含む冷凍サイクル装置の熱源機において、抽残液貯留容器を備え、前記熱源側熱交換器の下流と前記抽出分離機構の混合管とを接続し、前記油分離器の返油回路と前記混合管とを接続し、前記抽残液流出配管と前記抽残液貯溜容器とを接続したものである。

【００２４】本願発明による冷凍サイクル装置の熱源機は、請求項１７に記載のように、請求項１１～１６のいずれかに記載のものにおいて、前記抽残液貯溜容器には、抽残液貯溜容器内の液が外部へ逆流することを防止する機構を設けたものである。

【００２５】本願発明による冷凍サイクル装置の熱源機は、請求項１８に記載のように、請求項１１～１７のい

ずれかに記載のものにおいて、前記抽残液貯溜容器内部には抽残液もしくは原溶媒を吸着する吸着材を設けたものである。

【００２６】本願発明による冷凍サイクル装置の熱源機は、請求項１９に記載のように、請求項１１～１８のいずれかに記載のものにおいて、前記抽剤としてハイドロフルオロカーボン系の冷媒、前記抽料としてエステル油もしくはエーテル油のいずれかと鉱油もしくはハードアルキルベンゼン油のいずれかとの混合油としたものである。

【００２７】本願発明による冷凍サイクル装置の熱源機は、請求項２０に記載のように、請求項項１１～１９のいずれかに記載のものにおいて、前記抽出容器内の温度は、冷凍サイクルの低圧の飽和温度とするものである。

【００２８】本願発明による冷凍サイクル装置は、請求項２１に記載のように、利用側熱交換器を含む利用側機と、請求項１１～２０のいずれかに記載の熱源機とを接続配管により接続して冷媒回路を構成したものである。

【００２９】本願発明による冷凍サイクル装置は、請求項２２に記載のように、請求項２１に記載のものにおいて、前記接続配管として、既設の冷凍サイクル装置の接続配管を利用したものである。

【００３０】本願発明による冷凍サイクル装置の更新方法は、請求項２３に記載のように、既設の冷凍サイクル装置の熱源機を請求項１１～２０のいずれかに記載の熱源機に置換するとともに冷媒を置換するものである。

【００３１】

【発明の実施の形態】以下に本発明の実施の形態について図面を参照して詳細に説明する。なお各図中、同一または相当する部分には同一の符号を付してその説明を簡略化ないし省略する場合がある。

実施の形態１．図１は、本発明の実施の形態１を示す抽出分離機構を搭載した冷凍サイクル装置あるいは冷凍・空調装置の冷媒回路を示す。図１において、２３は圧縮機、２４は四方弁、２５は熱源側熱交換器、２６はアキュムレータである。１は抽出容器であり、抽料流入配管２を介してアキュムレータ２６の下部と接続され、流入配管２２および弁３１を介して熱源側熱交換器２５の下流で熱源側熱交換器２５と液管３８との間に接続される。さらに、抽残液流出配管４を介して抽残液貯留容器２９に接続され、抽残液貯溜容器２９の上部と吸入配管３０ａとは冷媒配管で接続される。６は液面発生容器であり、抽出容器１と液面発生容器６は上部連結管８と下部連結管９とで接続される。流出配管７は一端を液面発生容器６に接続され、他端は冷媒熱交換器２８および弁３２を介して配管３０により圧縮機２３の吸入配管３０ａに接続され、これらにより熱源機あるいは室外機５１を形成する。また、３９は負荷側熱交換器あるいは利用側熱交換器、４０は絞り装置であり、これらにより利用側機５２あるいは室内機５２を形成する。室外機５１と室内機５２は、液管３８（第一の接続配管）およびガス管３７（第二の接続配管）によって連結される。なお、図面の添え字のａ，ｂは、室内機が複数存在するマルチ式冷凍・空調システムであることを示すが、説明においては簡略化のため添字ａ，ｂを省略する。

【００３２】第一の冷媒、例えばＨＣＦＣ系もしくはＣＦＣ系の冷媒と、第一の冷凍機油（潤滑油）、例えば鉱油もしくはハードアルキルベンゼン油が用いられていた既存の冷凍・空調装置を、第二の冷媒、例えばＨＦＣ系冷媒と、第二の冷凍機油（潤滑油）、例えばエステル油もしくはエーテル油を用いる冷凍・空調装置に置換して、上記のような冷媒回路を形成する。

【００３３】上記のような構成の冷凍・空調機を施工する場合で、ＨＣＦＣ系もしくはＣＦＣ系の冷媒を充填したユニットに用いられていた液管およびガス管、もしくは液管・ガス管および室内機を流用し、ＨＦＣ系冷媒を用い、冷凍機油にエステル油を用いる室外機を新設した場合、液管とガス管および室内機にはＨＣＦＣ系またはＣＦＣ系の冷凍機油として用いられていた鉱油が残留している。このような状態で冷凍サイクルを冷房運転した場合の動作について説明する。圧縮機２３を吐出した高温・高圧のガス冷媒は、熱源側熱交換器２５で放熱し、凝縮・液化して液管３８を流れる。液管３８を流れる液冷媒は、液管３８内に残留する鉱油を、液冷媒と鉱油の間に生じる界面せん断力でひきずりながら液管３８中の鉱油を洗浄していく。液管３８を流れた液冷媒は、室内機５２に入り、蒸発気化し、ガス管３７を流れ、ガス配管３７中に残留する鉱油を、ガス冷媒と鉱油の間に生じるせん断力でひきずりながらガス管中の鉱油を洗浄していく。ガス管３７を流れたガス冷媒は、室外機５１に戻り、四方弁２４およびアキュムレータ２６を介して圧縮機２３へ戻る。このとき、圧縮機２３から持出されたエステル油が冷媒と共に既設の冷媒配管中を循環し、既設配管中に残留していた鉱油と混合し、冷媒と共にアキュムレータ２６に入る。

【００３４】既設配管から回収した鉱油を分離する場合には、弁３１、弁３２および弁３４を開き、弁３１で高圧の液冷媒を低圧の二相冷媒まで絞り、流入配管２２を介して抽出容器１に導く。また、アキュムレータ２６からは既設配管から回収した鉱油とエステル油の混合油が抽料流入配管２を介して抽出容器１に流入する。抽出容器１では、鉱油とエステル油の混合油中のエステル油が冷媒に抽出され、抽残液である鉱油に富む油が上層となって二相分離し、鉱油に富む油の量が多くなると、抽残液流出配管４を介して抽残液貯留容器２９に貯留される。下層となる冷媒とエステル油に富む油の混合液は、液面発生容器６内を通り流出配管７から流出し、冷媒熱交換器２８で液冷媒が蒸発・気化し、エステル油に富む油のみが圧縮機２３の吸入配管３０ａへ流入する。

【００３５】次に、暖房運転した場合の動作について説

明する。圧縮機２３を吐出した高温・高圧のガス冷媒は、ガス管３７を流れ、ガス管３７中に残留する鉱油を、ガス冷媒と鉱油の間に生じるせん断力でひきずりながらガス管中の鉱油を洗浄していく。ガス管３７を流れたガス冷媒は、負荷側熱交換器３９で放熱し、凝縮・液化して絞り装置４０で絞られ低圧の二相冷媒になる。この低圧の二相冷媒は液管３８を流れ、液管３８内に残留する鉱油を、液もしくはガスと鉱油の間に生じる界面せん断力でひきずりながら液管３８中の鉱油を洗浄していく。液管３８を流れた気液二相冷媒は、室外機５１に入り、熱源側熱交換器２５で蒸発し、四方弁２４およびアキュムレータ２６を介して圧縮機２３へ戻る。このとき、圧縮機２３から持出されたエステル油が冷媒と共に既設の冷媒配管中を循環し、既設配管中に残留していた鉱油と混合し、冷媒と共にアキュムレータ２６に入る。また、アキュムレータ２６には、冷房と暖房における必要冷媒量の差に相当する量の液冷媒が貯められる。

【００３６】既設配管から回収した鉱油を分離する場合には、弁３１は閉じ、弁３２、弁３４を開く。アキュムレータ２６内では、余剰の液冷媒が溜まっているので、既設配管から回収した鉱油は液面付近に浮遊しているかもしくは液冷媒に溶けているかの２通りである。このとき、アキュムレータ２６内の液面付近に浮遊している鉱油に富む油は暖房運転中は圧縮機２３へ戻ることはないので、冷媒に溶解している鉱油の回収のみを考える。アキュムレータ２６からは既設配管から回収した鉱油とエステル油の混合油が冷媒に溶解して抽料流入配管２を介して抽出容器１に流入する。抽出容器１では、熱源（図示せず）によって抽出容器１内を過熱し、冷媒を所定量まで蒸発させる。ここで、熱源は抽料流入配管２上に配置してもよい。この時、液冷媒の減少に伴い液冷媒への溶解度以上となった量の鉱油に富む油が析出し、抽出容器１内の液面付近に相をなす。ここで、抽残液貯留容器２９は冷媒配管により圧縮機の吸入配管３０ａと接続されているため、抽残液貯留容器２９内の圧力を抽出容器１内の圧力よりも低くすることができる。従って、抽出容器１の液面付近に相をなす鉱油に富む油は、抽出容器１と抽残液貯留容器２９の圧力差に従って抽残液流出配管４を介して抽出容器１から抽残液貯留容器２９に流れ込み、抽残液貯留容器２９に貯留される。冷媒とエステル油に富む油の混合液は、液面発生容器６内を通り流出配管７から流出し、冷媒熱交換器２８で液冷媒が、若干、蒸発・気化し圧縮機２３の吸入配管へ流入する。

【００３７】つぎに、抽出分離機構の構造および抽出分離の原理について説明する。図２は抽出分離機構の概略構成図である。図２において、１は抽出容器であり、抽出容器１には、抽料流入配管２、抽剤流入配管３、抽残液流出配管４が接続される。また、これらの配管を接続する位置は、密度の小さい抽料と密度の大きい抽剤を混合する観点から、鉛直方向の上から抽残液流出配管４、抽剤流入配管３、抽料流入配管２の順で抽出容器１に接続し、浮力により抽出容器１内を上昇する抽料と抽出容器１内を下降する抽剤とが適度に混ざり合うようにすることが望ましい。６は液面発生容器であり、抽出容器１と液面発生容器６とは、上部連結管８および下部連結管９とにより接続される。液面発生容器６には流出配管７が抽残液流出配管４よりやや低い位置に接続される。このとき、流出配管７と抽残液流出配管４の鉛直方向の高さの差は、抽出容器１内において、液面上部に相をなす抽残液の厚さによって決定する。なお、図２の抽出分離機構を図１の冷媒回路に適用する場合、図１の流入配管２２と図２の抽剤流入配管３とは同じものとなる。

【００３８】係る構成の抽出分離機構における抽質分離動作について説明する。抽剤流入配管３から冷媒液を流入させると、抽出容器１内の液面は、パスカルの原理から流出配管７の位置とほぼ同位置にくる。流出配管７が抽残液流出配管４よりやや低い位置とすることにより、抽残液が発生しない場合には、抽出容器１内に形成される液面高さが抽残液流出配管４より低くなるので、抽残液流出配管４から液冷媒が流出するのを防ぐことができる。次に、抽料流入配管２から、エステル油と鉱油の混合油を流入させると、抽出容器１内において、鉱油とエステル油の混合油からエステル油が冷媒に抽出され、密度差から抽残液である鉱油に富む油が二相分離して上面に浮く。この時の現象を図３の模式図を使って説明する。いま、抽出容器１内には、液冷媒がＨ３の高さまで、鉱油がＨ２の高さまで入っており、液面発生容器６にはＨ１まで冷媒液が入っているものとする。鉱油は冷媒液よりも密度が小さいので、図４に示すように、Ｈ２の高さが高くなるほど、抽出容器１と液面発生容器６との液面高さの差ΔＨが大きくなる。そこで、流出配管７を抽残液流出配管４よりΔＨの範囲内においてやや低くすることによって、抽出容器１内で分離し、抽出容器１の液面上部に相をなす鉱油に富む油を抽残液流出配管４から排出することができる。また、抽出容器１に鉱油が無い場合には、流出配管７と抽残液流出配管４の液面高さが同一となり、流出配管７が抽残液流出配管４よりやや低い位置にあることから、抽残液流出配管４から液冷媒が流出することはない。

【００３９】さらに、エステル油と鉱油の混合油と冷媒を抽出容器１へ流入させる比率とその流入量に関しては次のように決定する。図５に相分離特性曲線、図６に平衡曲線を示す。図５と図６とは水平に並べると相互の関係が理解しやすいが、出願書式の制約から出願時には水平に配列することができないので、上下に配列して示す。図５と図６を水平に配置して両図の横軸が同一延長線上にあるようにすると、図５の線分Ｅ－Ｊと図６のＪの線分とは同一延長線上でつながるものである。図５において、Ａは鉱油１００％、Ｂは冷媒１００％のポイント、Ｆは抽料の組成、Ｓは抽剤の組成であり、ΣはＦの

組成の抽料とＳの組成の抽剤をある比率で混ぜ合わせた場合で、かつ、二相分離しないと仮定した場合の組成である。Σが二相分離する領域内にある場合には、上部組成Ｒと下部組成Ｅに分離する。このときのＥ点は、図６に示す平衡曲線から決定できる。上部の相におけるエステル油と鉱油の比率ＰＲは、Ｂ点とＲ点を結んだ延長線と線分ＡＣとの交点として求めることができ、鉱油の比率が最も大きくなるように抽料と抽剤の混合比を決定する。ここで、エステル油と鉱油の混合油と冷媒を抽出容器１へ流入させるときの流入量は、抽出速度により予め決定し、抽出容器１への冷媒とエステル油と鉱油の混合油の流入量の制御は配管の流路抵抗等によって行う。抽出容器１内の温度に関しては、できるだけ低く設定することで、抽料が小量の場合でも二相分離するので、小量の鉱油まで分離することができる。特に、この抽出分離機構を図１に示すような冷凍サイクルと組合せて使用する場合には、抽出容器１が低圧となるようにすることで、二相分離して鉱油に富む油が析出しやすくなるので、鉱油の分離精度を高める効果がある。また、試験的に鉱油の分離精度を確かめることで、抽出容器１内の圧力を、適宜、高圧と低圧の間の中間圧としてもかまわない。一般には、抽出容器１内の温度は、冷凍サイクルの低圧の飽和温度とするのがよい。

【００４０】したがって、ＣＦＣ系もしくはＨＣＦＣ系の冷媒を用いて運転した冷凍・空調装置に用いられ、ＣＦＣ系もしくはＨＣＦＣ系冷凍サイクルの冷凍機油である鉱油が残留した既設配管を使用し、室外機もしくは室外機および室内機を新設し、冷媒にＨＦＣ系の冷媒を用いた冷凍空調装置において、通常運転を行いながら必要に応じて既設配管または既設配管および室内機に残留していた鉱油を回収し、劣化した鉱油とエステル油の混合により、エステル油が劣化するのを防止することができる。なお、抽剤をＲ４０７Ｃ、Ｒ４０４Ａ、Ｒ４１０Ａ、Ｒ３２等のＨＦＣ系冷媒とした場合、抽質としてはエステル油の変わりにエーテル油等の冷媒に相溶な油であればなんでも同様の効果を奏する。また、ＣＦＣ系もしくはＨＣＦＣ系で用いられる既設配管中に残留した油としては、鉱油の変わりにＣＦＣ系もしくはＨＣＦＣ系の冷媒に溶解する油で密度が液冷媒よりも小さければどんな冷凍機油でもよく、例えばＨＡＢ油等でも同様の効果がある。

【００４１】また、抽残液貯留容器２９には、逆流防止の弁を配置することにより、一旦、抽残液貯留容器２９に回収した鉱油が冷媒の寝込み等により逆流し、冷媒回路内へ再流出することを防止することができる。さらに、抽残液貯留容器２９内に鉱油を吸着する吸着剤を内蔵することにより、一旦、抽残液貯留容器２９に回収した鉱油が冷媒回路内へ再流出することを、簡易な構成で安価に防止することができる。

【００４２】また、鉱油をより精度よく分離するための抽出分離機構を図７に示す。図７において、添え字のａ、ｂは抽出分離機構が２系統存在することを示し、抽残液流出配管４ａと抽料流入配管２ｂを接続した構成としている。ただし、以下の説明では添え字のａ、ｂを省略する場合がある。図７において、１は抽出容器であり、抽出容器１には、抽料流入配管２、抽剤流入配管３、抽残液流出配管４が接続される。また、これらの配管を接続する位置は、密度の小さい抽料と密度の大きい抽剤を混合する観点から、鉛直方向の上から抽残液流出配管４、抽剤流入配管３、抽料流入配管２の順で抽出容器１に接続し、浮力により抽出容器１内を上昇する抽料と抽出容器１内を下降する抽剤とが適度に混ざり合うようにすることが望ましい。６は液面発生容器であり、抽出容器１と液面発生容器６とは、上部連結管８および下部連結管９とにより接続される。液面発生容器６には流出配管７が抽残液流出配管４よりやや低い位置に接続される。このとき、流出配管７と抽残液流出配管４の鉛直方向の高さの差は、抽出容器１内において、液面上部に相をなす抽残液の厚さによって決定する。

【００４３】係る構成の抽出分離機構の動作について説明する。抽剤流入配管３ａと３ｂから、各々、抽出容器１ａ，１ｂに液冷媒を流入させると、抽出容器１ａと液面発生容器６ａおよび抽出容器１ｂと液面発生容器６ｂの液面は、各々、同じ高さで上昇する。液面発生容器６ａ，６ｂ内の液面が、各々、流出配管７ａ，７ｂの位置までくると、液冷媒は、各々、流出配管７ａ，７ｂから流出するので、抽出容器１ａ，１ｂの液面は、各々、流出配管７ａ，７ｂの位置で一定となる。抽残液流出配管４ａ，４ｂは、各々、流出配管７ａ，７ｂよりも高い位置にあるので、液冷媒が抽残液流出配管４ａ，４ｂから流出することはない。ここで、抽料流入配管２ａから、エステル油と鉱油の混合油を抽出容器１ａに流入させると、エステル油が液冷媒に抽出され、鉱油に富む油が二相分離し、その量が増加すると、抽残液流出配管４ａから流出し、抽料流入配管２ｂを介して、抽出容器１ｂに流入する。抽出容器１ｂに流入した鉱油に富む油は、抽出容器１ｂ内の液冷媒と接触して再びエステル油が抽出され、さらに鉱油に富んだ油が抽出容器１ｂ内で二相分離し、やがて、抽残液流出配管４ｂから流出する。

【００４４】図８を用いて、図７における抽出分離機構の鉱油分離動作を説明する。図８において、Ｃは鉱油１００％、Ｂは冷媒１００％のポイント、Ｆは抽料の組成、Ｓは抽剤の組成であり、Σ１はＦの組成の抽料とＳの組成の抽剤をある比率で混ぜ合わせた場合で、かつ、二相分離しないと仮定した場合の組成である。Σ１は上部組成Ｒ１と下部組成Ｅ１に分離する。組成Ｒ１の上部の相を抽残液として分離し、再度、抽剤Ｓを混ぜると、上部組成Ｒ２と下部組成Ｅ２に分離する。組成Ｒ２における鉱油の比率は組成Ｒ１よりも小さくなるので、鉱油を分離する抽出分離機構としては精度を上げることがで

きる。なお、同様に３つ以上の抽出分離機構をつなぎあわせると、より高い鉱油分離性能が得られる。

【００４５】図９は、本発明の実施の形態１による抽出分離機構を搭載した冷凍サイクルの冷媒回路の他の例を示す。図９において、５３は圧縮機２３の吐出側と四方弁２４との間に挿入された油分離器であり、分離された油を絞り装置３６を介して返油管３５によりアキュムレータ２６に返油する。７２は配管（冷媒回路）であり、油分離器５３の出口側から弁３１、冷媒熱交換器２８、絞り装置５８を介して冷媒流入管２２に接続されている。その他は図１と同様であるから説明を省略する。この冷媒回路において、流入配管２２に流入させる液冷媒は、図９に示すように、流出配管７から流出する低温の二相冷媒と冷媒回路７２を流れる高温・高圧のガス冷媒を、冷媒熱交換器２８で熱交換させ、冷媒回路７２を流れる冷媒を凝縮・液化し、その液化した冷媒を絞り装置５８で絞った後、流入配管２２を介して抽出容器１内へ導いている。このような構成によっても同様の効果を奏する。

【００４６】なお、以上説明したこの発明の概念は次のようにも要約できる。この発明の抽出分離機構は、抽質と原溶媒とが混合した抽料と、抽剤とを、二相分離する比率で混合し、抽料中の抽質を抽剤に抽出すると共に、抽残液の密度と抽出液の密度との相違を利用して、抽残液のみを分離するものである。ここで、具体例としては、抽料は、原溶媒としての鉱油もしくはハードアルキルベンゼン油に、抽質としてのエステル油もしくはエーテル油が混合したものが該当する。また、抽剤としてハイドロフルオロカーボン系の冷媒が該当する。抽残液としては、抽質であるエステル油もしくはエーテル油が抽出された後の、原溶媒である鉱油もしくはハードアルキルベンゼン油に富む油が該当する。

【００４７】また、図２に示す抽出分離機構は次のようにも要約できる。すなわち、この抽出分離機構は、液面発生容器６と抽出容器１とを上部連結管８と下部連結管９とで接続し、抽出容器１に接続された抽料流入配管２、抽剤流入配管３、抽残液流出配管４とを備えると共に、液面発生容器６に流出配管（７）を接続し、抽残液の密度が抽出液の密度よりも小さい抽出分離機構において、溶液面発生容器６内に発生した液面位置より抽出容器１と接続される抽残液流出配管４の接続口の下部の方を高く位置させたものである。

【００４８】また、図１に示す冷凍サイクル装置の熱源機は次のようにも要約できる。すなわち、この熱源機は、圧縮機２３、熱源側熱交換器２５およびアキュムレータ２６を備え、熱源側熱交換器２５と液配管３８との間の配管と流入配管２２（図２の抽出分離機構の抽剤流入配管３に対応）とを接続する配管と、アキュムレータ２６の下部と抽料流入配管２とを接続する配管と、圧縮機２３の吸入配管を分岐し流出配管７と接続する配管と、抽残液流出配管４と接続され抽残液を貯留する抽残液貯溜容器２９を有するものである。

【００４９】また、図９に示す冷凍サイクル装置の熱源機は次のようにも要約できる。すなわち、この熱源機は、圧縮機２３、熱源側熱交換器２５、アキュムレータ２６および圧縮機２３の吐出側に接続された油分離器５３を備え、油分離器５３の下流と流入配管２２（図２の抽出分離機構の抽剤流入配管３に対応）とを接続する配管７２と、アキュムレータ２６の下部と抽料流入配管２とを接続する配管と、圧縮機２３の吸入配管を分岐し流出配管７と接続する配管と、抽残液流出配管４と接続され抽残液を貯留する抽残液貯溜容器２９とを有するものである。

【００５０】実施の形態２．図１０は、本発明の実施の形態２による抽出分離機構の構成の概要図である。図１０中、１０はシェル、１１、１２、１３は仕切板、１４は仕切板１１に開けられた孔、１５は仕切板１３に開けられた孔で、孔１４を孔１５よりもやや低い位置とする。１６、１７は仕切板１２の上部と下部に開けられた孔である。２は抽料流入配管であり、抽料流入配管２はシェル１０内の仕切板１２と仕切板１３で仕切られた空間４３内に一端を開口して接続される。３は抽剤流入配管であり、抽剤流入配管３はシェル１０内の仕切板１２と仕切板１３で仕切られた空間４３内に一端を開口して接続される。さらに、５は抽出液流出配管であり、抽出液流出配管５はシェル１０内の仕切板１２と仕切板１３で仕切られた空間４３内の底部付近などの下部に一端を開口して接続される。なお、抽出液流出配管５は、シェル１０内の仕切板１１と仕切板１２で仕切られた空間４２の下部に一端を開口して接続してもよい。

【００５１】係る構成の抽出分離機構の動作について説明する。抽剤流入配管３から冷媒液を流入させると、空間４２と空間４３の液面は共に孔１４に位置まで上昇する。液面が孔１４以上になると孔１４から液冷媒が空間４１側に流出し、空間４２および空間４３の液面が孔１４の位置に保たれる。ここで、抽料流入配管２からエステル油と鉱油の混合油を流入させると、空間４３において、エステル油が冷媒液に抽出されるとともに、鉱油が分離し、鉱油と冷媒液の密度差から空間４３の液面上部に鉱油に富む液相を形成する。この鉱油に富む油の相が厚くなると、空間４２の液面高さよりも空間４３の液面高さの方が高くなり、孔１５から空間４４に鉱油が流れ込むようになる。また、空間４３に流れ込む鉱油の量が減少すると、空間４３に形成される鉱油の相の厚さが減少し、液面高さも孔１５の位置に達しなくなり、空間４４には液冷媒が流れ込むことはない。したがって、エステル油と鉱油の混合油から、抽出分離した鉱油を貯留する容器を抽出分離機構と一体化することにより安価に製造することができる。

【００５２】なお、図１０の抽出分離機構を図１の冷媒

回路に適用するときは、図１０の抽出液流出配管５は、図１の流出配管７の位置に接続する。また、図１０では抽残液は内部に貯留するので、図１の抽残液流出配管４に相当するものは外部には出ていない。したがって接続する必要はない。

【００５３】なお、図１０に示す抽出分離機構は次のようにも要約できる。すなわち、この抽出分離機構は、シェル１０内の空間４２（液面発生容器に相当）と空間４３（抽出容器に相当）とを上部孔１６（上部連結管に相当）と下部孔１７（下部連結管に相当）とで接続し、空間４３に接続された抽料流入配管２と抽剤流入配管３と、孔１５（抽残液流出配管に相当）とを備えると共に、空間４２に孔１４（流出配管に相当）を設け、抽残液の密度が抽出液の密度よりも小さい抽出分離機構において、空間４２に発生した液面位置より空間４３の孔１５の方を高く位置させたものである。

【００５４】実施の形態３．図１１は、本発明の実施の形態３による抽出分離機構の構成の概要図である。図１１中、２０は外円筒形容器、２１は内円筒形容器であり、外円筒形容器２０は内円筒形容器２１を内封する。外円筒形容器２０と内円筒形容器２１の間には空間４３、内円筒形容器２１の内部には空間４２が形成される。また、内円筒形容器２１の上部と下部には孔１６と孔１７が開けられている。空間４３には、抽料流入配管２、抽剤流入配管３および抽残液流出配管４が接続されている。空間４２には、流出配管７が挿入され、空間４２内部における流出配管７の端部は、抽残液流出配管４よりやや低い位置とする。

【００５５】係る構成の抽出分離機構の動作について説明する。抽剤流入配管３から冷媒液が空間４３に入ると、孔１７を通って空間４２にも冷媒液が流れ、空間４２と空間４３の液面の高さは同一となって上昇する。空間４２において液面高さが流出配管７の端部以上に上昇すると、液冷媒は流出配管７に流れ込み、液面の高さは流出配管７の端部の位置に保たれる。この時、空間４３においても、同位置に液面が保たれ、抽残液流出配管７から液冷媒が流出することはない。次に、抽料流入配管２からエステル油と鉱油の混合油を流入させると、エステル油が冷媒液に抽出され、鉱油が分離し、鉱油と冷媒液の密度差から空間４３の液面上部に鉱油に富む液相を形成する。この鉱油の相が厚くなると、空間４２の液面高さよりも空間４３の液面高さの方が高くなり、抽残液流出配管４から鉱油に富む油が流出する。したがって、抽出分離機構を二重円筒構造とすることにより、安価でコンパクトに製造することができる。なお、図１１の抽出分離機構は図１などの冷媒回路にそのまま適用できる。

【００５６】なお、図１１に示す抽出分離機構の構成は次のようにも要約できる。すなわち、この抽出分離機構は、内円筒形容器２１内の空間４２（液面発生容器に相当）と、内円筒形容器２１と外円筒形容器２０とで形成する空間４３（抽出容器に相当）とを上部孔１６（上部連結管に相当）と下部孔１７（下部連結管に相当）とで接続し、空間４３に接続された抽料流入配管２と抽剤流入配管３と抽残液流出配管４とを備えると共に、空間４２に流出配管７を設け、抽残液の密度が抽出液の密度よりも小さい抽出分離機構において、空間４２に発生した液面位置より空間４３の抽残液流出配管４の方を高く位置させたものである。

【００５７】実施の形態４．図１２は、本発明の実施の形態４による抽出分離機構の構成の概要図である。図１２において、１は抽出容器であり、抽出容器１には、上部から抽残液流出配管、抽剤流入配管３、抽料流入配管２および抽出液流出配管７が順次接続される。また、抽出液流出配管７には電磁弁９６が配設される。さらに、抽出容器１の上部のガス中には第1の圧力センサー９８、抽出液の底部の液中には第２の圧力センサー９９が設置され、第１の圧力センサー９８と第２の圧力センサー９９の検知値から、制御器９７を介して電磁弁９６が開閉される。動作について説明する。抽出容器１には、抽剤流入配管３から抽剤が流入し、抽料流入配管２からは抽料が流入し、抽出容器１内で抽剤と抽料が混合し、抽残液と抽出液に分離する。ここで、電磁弁９６の開閉動作により、第１の圧力センサー９８と第２の圧力センサー９９の検知の差が一定になるように制御することで、密度の軽い抽残液の量が多くなる程、抽出容器１内の抽残液とガス部の界面の高さは抽出液のみがある場合の液面高さよりも高くすることができる。したがって、抽残液流出配管４を抽出液のみがある場合の液面高さよりも高い位置で抽出容器１と接続することで、抽残液のみを抽残液流出配管４から流出させることが可能となる。なお、図１２の抽出分離機構を図１または図９の冷媒回路に適用するときは、図１０の抽出液流出配管５は、図１または図９の流出配管７に接続する。

【００５８】また、図１２に示した抽出分離機構の構成は次のようにも要約できる。すなわち、抽残液の密度が抽出液の密度よりも小さい抽出分離機構において、抽出容器１と、抽出容器１に接続された抽料流入配管２、抽剤流入配管３、抽出液流出配管５、抽残液流出配管４とを備え、抽出容器１内の抽残液の液面と抽出容器１の底面との圧力差を一定とする制御機構と、圧力差が一定で抽出容器１内に抽剤のみがある場合の液面高さより抽残液流出配管４の接続口の下部の方を高く位置させたものである。

【００５９】実施の形態５．図１３は本発明の実施の形態５による抽出分離機構を搭載した冷凍サイクルの冷媒回路を示す。図１３において、２３は圧縮機、２４は四方弁、２５は熱源側熱交換器、２６はアキュムレータである。１は抽出容器であり、抽出容器１は、抽料流入配管２および弁５９を介してアキュムレータ２６と接続さ

れると共に、抽残液流出配管４を介して抽残液貯留容器２９に接続される。６は液面発生容器であり、抽出容器１と液面発生容器６は上部連結管８と下部連結管９とで接続される。流出配管７は一端を液面発生容器６に接続され、他端は冷媒熱交換器２８および弁３２を介して圧縮機２３の吸入配管３０ａに接続される。さらに、流入配管２２は弁３１を介して熱源側熱交換器２５と液管３８との間に接続される。抽出液流出配管５は流出配管７と冷媒熱交換器２８との間の配管と接続される。以上の構成により室外機５１を形成する。また、３９は負荷側熱交換器、４０は絞り装置であり、これらにより室内機５２を形成する。室外機５１と室内機５２は、液管３８およびガス管３７によって連結される。なお、図１３において、添え字のａ，ｂは、室内機が複数存在するマルチ式冷凍・空調システムであることを示すが、説明では簡略化のため添え字を省略する場合がある。

【００６０】上記のような構成の冷凍・空調機を施工する場合で、ＨＣＦＣ系もしくはＣＦＣ系の冷媒を充填したユニットに用いられていた液管およびガス管もしくは液管・ガス管および室内機を流用し、冷媒にＨＦＣ系冷媒・冷凍機油にエステル油を用いる室外機を新設した場合、液管とガス管および室内機にはＨＣＦＣ系またはＣＦＣ系の冷凍機油として用いられていた鉱油が残留している。このような状態で冷凍サイクルを冷房運転した場合の動作について説明する。圧縮機２３を吐出した高温・高圧のガス冷媒は、熱源側熱交換器で放熱し、凝縮・液化して液管３８を流れ、液管３８内に残留する鉱油を、液もしくはガスと鉱油の間に生じる界面せん断力でひきずりながら液管３８中の鉱油を洗浄していく。液管３８を流れた液冷媒は、室内機５２に入り、蒸発気化し、ガス管３７を流れ、ガス配管中に残留する鉱油を、ガス冷媒と鉱油の間に生じるせん断力でひきずりながらガス管中の鉱油を洗浄していく。ガス管３７を流れたガス冷媒は室外機５１に戻り、四方弁２４およびアキュムレータ２６を介して圧縮機２３へ戻る。このとき、圧縮機から持出されたエステル油が冷媒と共に既設の冷媒配管中を循環し、既設配管中に残留していた鉱油と混合し、冷媒と共にアキュムレータ２６に入る。

【００６１】図１４は、本発明の実施の形態５による抽出分離機構の構成の概要図であり、図１３の冷凍サイクル装置に適用できるものである。図１４中、１は抽出容器であり、抽出容器１には抽料流入配管２、抽残液流出配管４、抽出液流出配管５が接続される。６は液面発生容器であり、抽出容器１と液面発生容器６は上部連結管８と下部連結管９とで接続されている。また、液面発生容器６には流入配管２２と流出配管７とが接続されている。ここで、流出配管７と液面発生容器６との接続位置は、抽残液流出配管４よりも鉛直方向にやや低くする。

【００６２】係る構成の抽出分離機構の動作について説明する。流入配管２２から気液二相冷媒を液面発生容器６に流入させ、流出配管７から流出させると、流出配管７の位置に液面が発生する。また、液面発生容器６と抽出容器１は上部連絡管８と下部連絡管９で接続されているので、均圧されて、抽出容器１内にも流出配管７と同位置に液面が生じる。ここで、抽料流入配管２からエステル油と鉱油の混合油を流入させると、エステル油が冷媒液に抽出され、鉱油が分離し、鉱油と冷媒液の密度差から抽出容器１の液面上部に鉱油に富む液相を形成する。この鉱油の相が厚くなると、液面発生容器６の液面高さよりも抽出容器１の液面高さの方が高くなり、抽残液流出配管４から鉱油が流出する。

【００６３】図１５は、本発明の実施の形態５による抽出分離機構の構成の変形例の概要図である。図１５に示すように、抽出容器１において、抽残液流出配管４の接続部近傍の水平方向の断面積を他の部分、特に抽残液流出配管４の接続部近傍より低い部分の水平方向の断面積より小さくすることによって、分離された鉱油が少ない場合でも、分離された鉱油の相の高さを高くすることができるので、小量の鉱油でも分離が可能となる。

【００６４】図１６は本発明の実施の形態５による抽出分離機構を搭載した冷凍サイクルの冷媒回路の他の例を示す。図１６において、２３は圧縮機、５３は油分離器、２４は四方弁、２５は熱源側熱交換器、２６はアキュムレータである。１は抽出容器であり、抽出容器１は、抽料流入配管２および弁３４を介して返油回路３５と接続されると共に、抽残液流出配管４を介して抽残液貯留容器２９に接続される。６は液面発生容器であり、抽出容器１と液面発生容器６は上部連結管８と下部連結管９とで接続される。流出配管７は一端を液面発生容器６に接続され、他端は冷媒熱交換器２８および弁３２を介して圧縮機２３の吸入配管３０ａに接続される。さらに、流入配管２２は弁３１を介して熱源側熱交換器２５と液管３８との間に接続される。抽出液流出配管５は、流出配管７と冷媒熱交換器２８との間の配管と接続される。以上のように室外機５１を形成する。また、３９は負荷側熱交換器、４０は絞り装置であり、これらにより室内機５２を形成する。室外機５１と室内機５２は、液管３８およびガス管３７によって連結される。なお、図１６において、添え字のａ，ｂは、室内機が複数存在するマルチ式冷凍・空調システムであることを示すが、説明では簡略化のために記載を省略する。

【００６５】上記のような構成の冷凍・空調機を施工する場合で、ＨＣＦＣ系もしくはＣＦＣ系の冷媒を充填したユニットに用いられていた液管およびガス管もしくは液管・ガス管および室内機を流用し、冷媒にＨＦＣ系冷媒・冷凍機油にエステル油を用いる室外機を新設した場合、液管とガス管および室内機にはＨＣＦＣ系またはＣＦＣ系の冷凍機油として用いられていた鉱油が残留している。このような状態で冷凍サイクルを冷房運転した場合の動作について説明する。圧縮機２３を吐出した高温

・高圧のガス冷媒は、熱源側熱交換器で放熱し、凝縮・液化して液管３８を流れ、液管３８内に残留する鉱油を、液もしくはガスと鉱油の間に生じる界面せん断力でひきずりながら液管３８中の鉱油を洗浄していく。液管３８を流れた液冷媒は、室内機５２に入り、蒸発気化し、ガス管３７を流れ、ガス配管中に残留する鉱油を、ガス冷媒と鉱油の間に生じるせん断力でひきずりながらガス管中の鉱油を洗浄していく。ガス管３７を流れたガス冷媒は室外機５１に戻り、四方弁２４およびアキュムレータ２６を介して圧縮機２３へ戻る。このとき、圧縮機２３から持出されたエステル油が冷媒と共に既設の冷媒配管中を循環し、既設配管中に残留していた鉱油と混合し、冷媒と共にアキュムレータ２６に入る。

【００６６】既設配管から回収した鉱油を分離する場合には、弁３１、弁３２および弁３４を開き、弁３１で高圧の液冷媒を低圧の二相冷媒まで絞り、流入配管２２を介して液面発生容器６に導く。また、返油回路３５からは既設配管から回収した鉱油とエステル油の混合油が弁３４にて低圧まで絞られて、抽料流入配管２を介して抽出容器１に流入する。抽出容器１では、エステル油が冷媒に抽出され、抽残液である鉱油に富む油が上層となって二相分離し、鉱油に富む層の厚さが厚くなると、鉱油に富む油が抽残液流出配管４を介して抽残液貯留容器２９に流れ貯留される。抽出液である冷媒とエステル油に富む油の混合液は、抽出液流出配管５から流出し、流出配管７から流出した気液二相冷媒と合流した後、冷媒熱交換器２８で液冷媒が蒸発・気化し、エステル油に富む油のみが圧縮機２３の吸入配管へ流入する。

【００６７】従って、冷媒流量が小さく冷媒回路内で圧力差がつきにくい条件においても、油分離器５３と抽出容器１の圧力差を大きくとることができ、抽出容器１への油の流動をスムーズにできるので、冷凍サイクルの広い運転範囲において、抽出分離することができる。

【００６８】なお、図１６に示す冷凍サイクル装置の熱源機の構成は次のようにも要約できる。すなわち、この熱源機は、圧縮機２３、この圧縮機２３の吐出側に接続された油分離器５３、熱源側熱交換器２５およびアキュムレータ２６を備え、熱源側熱交換器２５と液配管２７との間の配管と流入配管（２２）とを接続した図１４および図１５に記載の抽出分離機構と、油分離器5.3から絞り機構３６を介してアキュムレータ２６に返油する返油回路３５と、返油回路３５を分岐し抽料流入配管２とを接続する配管と、圧縮機２３の吸入配管を分岐し流出配管７と接続する配管と、圧縮機２３の吸入配管を分岐し抽出液流出配管５と接続する配管と、抽残液流出配管４と接続され抽残液を貯留する抽残液貯溜容器を有するものである。

【００６９】実施の形態６．図１７は本発明の実施の形態６による抽出分離機構を搭載した冷凍サイクルの冷媒回路を示す。図１７において、２３は圧縮機、５３は油分離器、２４は四方弁、２５は熱源側熱交換器、２６はアキュムレータである。アキュムレータ２６の内部は、仕切板８３により、上部空間２６ａと下部空間２６ｂに分離され、上部空間２６ａと下部空間２６ｂは冷媒戻し管７５により連通される。７３は両端を開放した通気管であり、通気管７３は一端を上部空間２６ａの上部に、他端を上部空間２６ａの底部に位置するように設置される。また、通気管７３と冷媒戻し管７５は、仕切板８３からの鉛直方向の距離が等しい各々の中間の位置で、連通管７４によって連通される。７６は気液分離用のデミスタ、８４は一端を下部空間２６ｂの上部に開口し、他端をアキュムレータ２６の外部に開口するＵ字管であり、Ｕ字の最下端は下部空間２６ｂの底部の位置に来るように設置される。また、Ｕ字管の最下端付近には、返油孔７７が開けられている。２９は抽残液貯留容器であり、上部空間２６ａとは抽残液流出配管４および逆止弁８０を介して連通される。抽残液流出配管４は連通管７４よりもおよそ各配管の半径の和よりも高い位置に接続することが望ましい。また、抽残液貯留容器２９の上部は、背圧管８５および絞り７９を介してＵ字管出口と接続される。

【００７０】上記のような構成の冷凍・空調機を施工する場合で、ＨＣＦＣ系もしくはＣＦＣ系の冷媒を充填したユニットに用いられていた液管およびガス管、もしくは液管・ガス管および室内機を流用し、冷媒にＨＦＣ系冷媒・冷凍機油にエステル油を用いる室外機を新設した場合、液管とガス管および室内機にはＨＣＦＣ系またはＣＦＣ系の冷凍機油として用いられていた鉱油が残留している。このような状態で冷凍サイクルを冷房運転した場合の動作について説明する。圧縮機２３を吐出した高温・高圧のガス冷媒は、油分離器５３でガス冷媒中に含まれるエステル油の噴霧を分離され、熱源側熱交換器２５で放熱し、凝縮・液化して液管３８を流れる。液管３８を流れる液冷媒は、液管３８内に残留する鉱油を、液冷媒と鉱油の間に生じる界面せん断力でひきずりながら液管中の鉱油を洗浄していく。液管３８を流れた液冷媒は、室内機５２に入り、蒸発気化し、ガス管３７を流れ、ガス配管中に残留する鉱油を、ガス冷媒と鉱油の間に生じるせん断力でひきずりながらガス管中の鉱油を洗浄していく。ガス管３７を流れたガス冷媒は、室外機５１に戻り、四方弁２４およびアキュムレータ２６を介して圧縮機２３へ戻る。

【００７１】ここで、アキュムレータ２６内部での鉱油の分離動作について説明する。圧縮機２３内部のエステル油に既設配管中に残留した鉱油が混ざった場合には、油分離器５３で分離されたエステル油と鉱油の混合油が返油配管３５と絞り３６を介してアキュムレータ２６の混合配管（吸入配管）４５に流入し、既設配管から回収された鉱油と混合する。さらに、熱源側熱交換器２５で凝縮した液冷媒が絞り７８で低圧まで絞られアキュムレ

ータ２６の混合配管（吸入配管）４５に流入し、前記エステル油と鉱油の混合油と混ざり合いエステル油と鉱油の混合油からエステル油が冷媒液に抽出され、アキュムレータ２６に流入する。アキュムレータ２６に流入した冷媒ガス・エステル油の溶けた冷媒液およびわずかにエステル油が溶けた鉱油は気液分離用デミスタ７６によってガス冷媒と液体とに分離され上部空間２６ａに入る。上部空間２６ａ内のガス冷媒は冷媒戻し管７５を介して下部空間２６ｂに流入しＵ字管８４を流れて圧縮機２３に戻る。気液分離用デミスタ７６で分離された液は、上部空間２６の底部に溜まり、わずかにエステル油が溶けた鉱油が上相、エステル油が溶けた冷媒液が下相となって二相分離する。上相のわずかにエステル油の溶けた鉱油は抽残液流出配管４および逆止弁８０を介して抽残液貯留容器２９に溜まる。一方、上部空間２６ａの下相をなすエステル油の溶けた液冷媒は上相の圧力に押されて通気管７３を上昇し、連通管７４および冷媒戻し管７５を介して下部空間２６ｂに流れ、下部空間２６ｂの底部に溜まる。下部空間２６ｂの底部に溜まったエステル油の溶けた液冷媒は、冷媒流量に応じた量だけ返油孔７７からＵ字管８４内部に流入し、冷媒ガスと共に圧縮機２３に流入する。

【００７２】次に、暖房運転した場合の動作について説明する。圧縮機２３を吐出した高温・高圧のガス冷媒は、ガス管３７を流れ、ガス管３７中に残留する鉱油を、ガス冷媒と鉱油の間に生じるせん断力でひきずりながらガス管中の鉱油を洗浄していく。ガス管３７を流れたガス冷媒は、負荷側熱交換器３９で放熱し、凝縮・液化して絞り装置４０で絞られ低圧の二相冷媒になる。この低圧の二相冷媒は液管３８を流れ、液管３８内に残留する鉱油を、液もしくはガスと鉱油の間に生じる界面せん断力でひきずりながら液管３８中の鉱油を洗浄していく。液管３８を流れた気液二相冷媒は、室外機５１に入り、熱源側熱交換器２５で蒸発し、四方弁２４およびアキュムレータ２６を介して圧縮機２３へ戻る。このとき、圧縮機２３から持出されたエステル油が冷媒と共に既設の冷媒配管中を循環し、既設配管中に残留していた鉱油と混合し、冷媒と共にアキュムレータ２６に入る。また、アキュムレータ２６には、冷房と暖房における必要冷媒量の差に相当する量の液冷媒が貯められる。ここで、アキュムレータ２６内部での鉱油の分離動作は冷房時と同様である。

【００７３】従って、鉱油とエステル油の混合油と冷媒液をアキュムレータ２６の混合配管（吸入配管）４５中で混合させることにより、効率よく混合するので、冷媒液へのエステル油の抽出を確実に行うことができる。この結果、既設配管から回収した鉱油を確実に分離し、冷凍サイクルの信頼性を高めることができる。

【００７４】図１８は、本発明の実施の形態６による抽出分離機構を搭載した冷凍サイクルの冷媒回路の他の例を示す。上記の図１６では、仕切板８３によりアキュムレータ２６を上下２段に分割した例を示したが、図１８に示す例でも同様の効果を得ることができる。つまり、仕切板８３ａおよび仕切板８３ｂによって左右の空間９４ａと９４ｂに分割し、仕切板８３ａには上部の隙間９３ａと下部の隙間９３ｂを設けると共に、仕切板８３ｂの高さを隙間９３ａと隙間９３ｂの間の高さとすると、空間９４ａにはわずかにエステル油が溶けた鉱油が上相、エステル油が溶けた冷媒液が下相となって二相分離する。空間９４ａの底部の液冷媒は隙間９３ｂを通って仕切板８３ａと仕切板８３ｂの間に溜まり、空間９４ａ内の鉱油の量が増加するにしたがって、仕切板８３ａと仕切板８３ｂの間の冷媒液面の高さも上昇し、その高さが仕切板８３ｂの上端まで来ると、空間９４ｂに流れ込むようになるので、鉱油は空間９４ａに溜めることができる。

【００７５】なお、図１７に示す抽出分離機構の構成は次のようにも要約できる。すなわち、この抽出分離機構は、抽出容器１内の上部に一端を開口し、他端を抽出容器１底部に開口する通気管７３と、抽出容器１の上部に一端を開口し他端を抽出容器１外に開口する液戻し管７５と、通気管７３と液戻し管７５を連通管７４にて連通し、連通管７４よりも高い位置で抽残液流出配管４を抽出容器１と接続し、抽残液流出配管４と抽残液貯溜容器２９を逆止弁８０を介して接続した抽出分離機構において、混合配管４５にて抽料と抽剤を混合した後に抽出容器１内に導くものである。

【００７６】また、図１７に示す冷凍サイクル装置の熱源機の構成は次のようにも要約できる。すなわち、この熱源機は、圧縮機２３、油分離器５３、熱源側熱交換器２５およびアキュムレータ２６と、油分離器５３から絞り機構３６を介して混合配管４５に返油する返油回路３５とを備え、熱源側熱交換器２５と液配管２７との間の配管を分岐し混合配管４５と接続すると共に、返油回路３５を混合配管４５と接続し、混合配管４５の出口とアキュムレータ２６の入口とを接続し、アキュムレータ２６内部において上下に階層分けされた第１の空間（上部空間）２６ａと第２の空間（下部空間）２６ｂを設け、第１の空間２６ａの上部に一端を開口し他端を第１の空間２６ａの底部に開口する通気管７３と、第１の空間２６ａの上部に一端を開口し他端を第２の空間２６ｂに開口する液戻し管７５と、通気管７３と液戻し管７５を連通管７４にて連通し、連通管７４よりも高い位置で抽残液流出配管４を第1の空間２６ａと接続し、抽残液流出配管４と抽残液貯溜容器２９を逆止弁８０を介して接続したものである。

【００７７】また、図１８に示す抽出分離機構は次のようにも要約できる。すなわち、この抽出分離機構は、容器１内の空間９４ａと空間９４ｂとを上部孔９３ａと下部孔９３ｂとで接続し、空間９４ａに接続された抽料と

抽剤との混合配管４５を備えると共に、空間９４ｂを中間の高さで開放し、抽残液の密度が抽出液の密度よりも小さい抽出分離機構において、空間９４ｂから抽出液を外部へ流出させるものである。

【００７８】実施の形態７．図１９は本発明の実施の形態７による抽出分離機構を搭載した冷凍サイクルの冷媒回路を示す。図１９において、実施の形態５と同一部分には、同一の記号を付し、説明を省略する。図１９において、７３は通気管であり、上部空間２６ａに上向きに突出して一端を開口し、他端は仕切板８３を貫通し下部空間２６ｂ側に開口する。７５は冷媒液戻し管であり、一端を上部空間２６ａに開口すると共に、他端を下部空間２６ｂに開口する。冷媒液戻し管７５の上部空間２６ａ側の端部には、鉱油と冷媒液の中間の密度のフロート弁８１を設置し、上部空間２６ａ内の冷媒液の量によって上下に運動する。

【００７９】ここで、図１９に示した冷媒回路において、冷房または暖房運転を行いながら既設配管から回収した鉱油とエステル油の混合油から鉱油を分離する動作について説明する。圧縮機２３内部のエステル油に既設配管中に残留した鉱油が混ざった場合には、油分離器５３で分離されたエステル油と鉱油の混合油が返油配管３５と絞り３６を介してアキュムレータ２６の混合配管（吸入配管）４５に流入し、既設配管から回収された鉱油と混合する。さらに、熱源側熱交換器で凝縮した液冷媒が絞り７８で低圧まで絞られアキュムレータ２６の混合配管（吸入配管）４５に流入し、前記エステル油と鉱油の混合油と混ざり合い、エステル油と鉱油の混合油からエステル油が冷媒液に抽出され、アキュムレータ２６に流入する。アキュムレータ２６に流入した冷媒ガス・エステル油の溶けた冷媒液および鉱油は気液分離用デミスタ７６によってガス冷媒と液体とに分離され上部空間２６ａに入る。上部空間２６ａ内のガス冷媒は通気管７３を介して下部空間２６ｂに流入し、Ｕ字管８４を流れて圧縮機２３に戻る。気液分離用デミスタ７６で分離された液は、上部空間２６ａの底部に溜まり、わずかにエステル油が溶けた鉱油が上相、エステル油が溶けた冷媒液が下相となって二相分離する。ここで、フロート弁８１の密度は、鉱油より重く、冷媒液よりも軽いので、上相と下相の界面付近に浮遊する。下相をなす冷媒液の量が増加すると、フロート弁８１が冷媒液の高さに応じて上昇し、冷媒液戻し管７５の端部を開き、上部空間２６ａの底部に溜まった冷媒液を下部空間２６ｂに流す。下部空間２６ｂの底部に溜まったエステル油の溶けた液冷媒は、冷媒流量に応じた量だけ返油孔７７からＵ字管８４内部に流入し、冷媒ガスと共に圧縮機２３に流入する。

【００８０】従って、鉱油と冷媒液の界面をフロート弁８１で制御し、エステル油の溶けた冷媒液を下部空間２６ｂを介して圧縮機へ戻すことにより、上部空間２６ａに鉱油を貯めることが可能となり、簡易な構成で既設配管から回収した鉱油を分離・除去でき、かつ、冷凍サイクルの信頼性を高めることができる。

【００８１】図２０は、本発明の実施の形態７による抽出分離機構を搭載した冷凍サイクルの冷媒回路の他の例を示す。図２０の抽出分離機構と冷媒回路は、図１８に示したものに、さらにフロート弁８１により制御される抽出液の液面高さよりも高い位置で抽残液流出配管４を抽出容器１と接続し、抽残液流出配管４と抽残液貯溜容器２９とを逆止弁８０を介して接続したものである。

【００８２】図２１は、本発明の実施の形態７による抽出分離機構を搭載した冷凍サイクルの冷媒回路のさらに他の例を示す。図１８の例では、仕切板８３によりアキュムレータ２６を上下２段に分割した例を示したが、図２１に示す例でも同様の効果を得ることができる。つまり、仕切板８３によって左右の空間９４ａと９４ｂに分割し、仕切板８３には上部の隙間９３を設ける。空間９４ａの底部と空間９４ｂの底部はフロート式開閉弁９２を介して配管９３で接続される。フロート９１は鉱油の密度より大きく冷媒液の密度よりも軽くすることにより、フロート９１は、空間９４ａ内で鉱油と冷媒液の界面付近に浮遊する。従って、空間９４ａの底部の冷媒液の量が増加すると、フロート９１が上昇すると共に、フロート式開閉弁９２が開き、配管９３を介して冷媒液を空間９４ａから空間９４ｂへ流すことによって、鉱油のみを空間９４ａに溜めることができる。

【００８３】なお、図１９に示す抽出分離機構は次のようにも要約できる。すなわち、この抽出分離機構は、抽出容器１内の底部に一端を開口し、他端を抽出容器１外に開口する液戻し管７５と、抽出容器１の上部と容器外部とを連通する通気管と、抽料と抽剤を混合した後に抽出容器１内に導く混合配管４５と、抽残液の密度と抽出液の密度の間の密度となるフロート弁８１を液戻し管７５の開閉装置として設け、抽出容器１内の抽出液の液面高さが所定値以上となると、フロート弁８１を開放し抽出液のみを抽出容器１外へ排出するものである。

【００８４】また、図２１に示す抽出分離機構は次のようにも要約できる。すなわち、この抽出分離機構は、容器１内の空間９４ａと空間９４ｂとを上部孔９３で連通させるとともに、互いの下部をフロート式開閉弁９２を介して接続し、フロート９１によって開閉弁９２を開閉し、抽出液を空間９４ａから空間９４ｂへ移動させるものである。

【００８５】実施の形態８．図２２は本発明の実施の形態８による抽出分離機構を搭載した冷凍サイクルの冷媒回路を示す。図２２において、実施例５と同一部分には、同一の記号を付し、説明を省略する。図２２において、７３は通気管であり、上部空間２６ａに上向きに突出して一端を開口し、他端は仕切板８３を貫通し下部空間２６ｂ側に開口する。８７は冷媒液吸引管、９６は電

磁弁であり、冷媒液吸引管８７の一端は上部空間２６ａの底部に開口すると共に、他端は電磁弁９６を介してＵ字管８４の出口と接続される。

【００８６】ここで、図２２の装置で、冷房または暖房運転を行いながら既設配管から回収した鉱油とエステル油の混合油から鉱油を分離する動作について説明する。圧縮機２３内部のエステル油に既設配管中に残留した鉱油が混ざった場合には、油分離器５３で分離されたエステル油と鉱油の混合油が返油配管３５と絞り３６を介してアキュムレータ２６の混合配管（吸入配管）管４５に流入し、既設配管から回収された鉱油と混合する。さらに、熱源側熱交換器２５で凝縮した液冷媒が絞り７８で低圧まで絞られアキュムレータ２６の混合配管（吸入配管）４５に流入し、前記エステル油と鉱油の混合油と混ざり合い、エステル油と鉱油の混合油からエステル油が冷媒液に抽出され、アキュムレータ２６に流入する。アキュムレータ２６に流入した冷媒ガス・エステル油の溶けた冷媒液および鉱油は気液分離用デミスタ７６によってガス冷媒と液体とに分離され上部空間２６ａに入る。上部空間２６ａ内のガス冷媒は、通気管７３を介して下部空間２６ｂに流入し、Ｕ字管８４を流れて圧縮機２３に戻る。気液分離用デミスタ７６で分離された液は、上部空間２６ａの底部に溜まり、わずかにエステル油が溶けた鉱油が上相、エステル油が溶けた冷媒液が下相となって二相分離する。下相をなす冷媒液の量が増加した場合には、界面センサ８２が冷媒液と鉱油の界面の上昇を検知し、電磁弁９６を開く。電磁弁９６を開くと、上部空間２６ａの底部に溜まった冷媒液が、冷媒液吸引管８７を流れ電磁弁９６を介してＵ字管出口に流れ込む。また、一時的に、冷媒液の流入量が大きくなり、界面センサ８８に位置まで界面が上昇した場合には、電磁弁８９を開き、配管９０を介して上部空間２６ａの底部の冷媒液を下部空間２６ｂに流す。

【００８７】従って、鉱油とエステル油の界面を精度よく検知することにより、鉱油の分離精度を高めると共に、アキュムレータへの冷媒液流入量が一時的に増加した場合でも、冷媒液を下部空間２６ｂに適切に貯留することができるので、鉱油を確実に貯留することができる。

【００８８】なお、ここで、界面センサとしては、静電容量センサや、赤外線等の吸光度を検知するものや、光の屈折率の差を検知するものなどが一般的である。

【００８９】なお、図２２に示す抽出分離機構は次のようにも要約できる。すなわち、この抽出分離機構は、抽出容器１の上部と容器外部の空間とを連通する通気管７３と、冷媒液吸引管８７と、抽料と抽剤を混合した後に抽出容器１内に導く混合配管４５と、抽残液と抽出液の界面の移動を検出する界面センサー８２と、界面センサー８２の信号によって冷媒吸引管８７から抽出液を吸引する電磁弁９６を設けたものである。

【００９０】

【発明の効果】本発明に係る抽出分離機構によれば、請求項１に記載したように、抽質と原溶媒とが混合した抽料と抽剤とを二相分離する比率で混合し、抽料中の抽質を抽剤に抽出すると共に抽残液の密度が抽出液の密度よりも小さい抽出分離機構において、抽残液のみを分離する機構を備えたので、抽質と抽残液とを確実に分離することができる。

【００９１】本発明に係る抽出分離機構によれば、請求項２，３に記載したように、抽剤により抽料から所定成分を抽出する抽出容器と、抽剤流出配管を有する液面発生容器とを、それぞれ鉛直方向の下部および上部で互いに連通させ、抽剤流出配管と抽残液流出配管とを抽剤流出配管により形成する液面よりも抽残液流出配管により形成する液面が高くなるように配置したので、抽出容器内の液面の位置を簡易に制御し、抽残液を効果的に分離することができる。

【００９２】本発明に係る抽出分離機構によれば、請求項４に記載したように、抽剤により抽料から所定成分を抽出する抽出容器と、抽出容器内の底面と液面との圧力差を一定にする制御機構とを含み、抽出容器内に抽剤のみがある場合の液面高さより抽残液流出配管により形成する液面が高くなるように抽残液流出配管を配置したので、抽残液のみを確実に分離することができる。

【００９３】本発明に係る抽出分離機構によれば、請求項５に記載したように、抽剤により抽料から所定成分を抽出する抽出容器と、抽剤流入配管と抽剤流出配管とを備えた液面発生容器とを、それぞれ鉛直方向の下部および上部で互いに連通させ、抽剤流出配管と抽残液流出配管とを抽剤流出配管により形成する液面よりも抽残液流出配管により形成する液面が高くなるように配置した。すなわち、液面発生容器に気液二相流を流入させる流入配管と、気液二相流を流出させる流出配管とを設け、流出配管と液面発生容器との接続口付近に液面を発生させることができるので、抽出容器内の液面を精度よく制御することができ、もって効果的に抽出液と抽残液とを分離することができる。

【００９４】本発明に係る抽出分離機構によれば、請求項６に記載したように、抽出容器において、抽残液流出配管の接続部近傍の水平方向の断面積を接続部近傍より低い部分の水平方向の断面積よりも小さくしたので、抽残液の量が小量の場合でも、抽残液を確実に分離できる。

【００９５】本発明に係る抽出分離機構によれば、請求項７，８に記載したように、抽料と抽剤を混合する混合配管と、前記混合配管と接続し、上部に抽残液流出配管、下部に抽出液流出配管を接続する抽出容器と、前記抽出容器内の抽残液の液面高さを、前記抽残液流出配管と前記抽出容器の接続口の下部よりも高い位置に制御する手段を設けたので、抽料と抽剤を効率よく混合し、抽

残液を確実に分離することができる。

【００９６】本発明に係る抽出分離機構によれば、請求項９に記載したように、抽料と抽剤を混合する混合配管と、前記混合配管と接続し、上部に抽残液流出配管、下部に抽出液流出配管を接続する抽出容器と、前記抽出容器内の抽残液と抽出液の界面高さを前記抽出液流出配管と前記抽出容器の接続部より高い位置に制御する手段を設けたので、抽出容器内に確実に抽残液を貯留することができ、かつ、抽残液を貯留する別容器を必要としないので、安価に装置を製作することができる。

【００９７】本発明に係る抽出分離機構によれば、請求項１０に記載したように、抽料と抽剤を混合する混合配管と、前記混合配管と接続し、上部に抽残液流出配管、下部に抽出液流出配管を接続する抽出容器と、前記抽出容器内の抽残液の液面高さを、前記抽残液流出配管と前記抽出容器の接続口の下部より高い位置に制御すると共に、抽残液と抽出液の界面高さを前記抽出液流出配管と前記抽出容器の接続口より高い位置に制御する手段を設けたので、抽出容器内に確実に抽残液を貯留することができると共に、一時的に抽出容器への抽出液の流入量が増加した場合でも、抽出容器内の抽残液面および抽残液と冷媒液の界面の位置を安定して制御することができる。

【００９８】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１１に記載したように、　請求項１～４のいずれかに記載の抽出分離機構を備え、熱源側熱交換器の下流と抽出分離機構の抽剤流入配管とを接続し、アキュムレータの下部と抽料流入配管とを接続し、圧縮機の吸入配管と液面発生器の抽剤流出配管とを接続したので、既設配管中から回収した鉱油にエステル油やエーテル油といったＨＦＣ系冷媒対応の冷凍機油が混合した場合でも、鉱油を分離回収することができる。

【００９９】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１２に記載したように、圧縮機の吐出側に接続された油分離器と、請求項１～４のいずれかに記載の抽出分離機構とを備え、油分離器の下流と抽出分離機構の抽剤流入配管とを絞り手段を介して接続し、アキュムレータの下部と抽料流入配管とを接続すると共に、圧縮機の吸入配管と抽剤流出配管とを接続し、かつ、油分離器の下流から絞り手段の間の配管と、圧縮機の吸入配管と抽剤流出配管の間の配管を熱交換させる冷媒熱交換器を備えたので、既設配管中から回収した鉱油にエステル油やエーテル油といったＨＦＣ系冷媒対応の冷凍機油が混合した場合でも、鉱油を分離回収することができる。

【０１００】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１３に記載したように、請求項５または６に記載の抽出分離機構を備え、熱源側熱交換器の下流と抽出分離機構の抽剤流入配管とを接続し、アキュムレータの下部と抽料流入配管とを接続し、圧縮機の吸入配管と抽剤流出配管とを接続し、圧縮機の吸入配管と抽出液流出配管とを接続したので、既設配管中から回収した鉱油にエステル油やエーテル油といったＨＦＣ系冷媒対応の冷凍機油が混合した場合でも、鉱油を分離回収することができる。

【０１０１】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１４に記載したように、　圧縮機の吐出側に接続された油分離器を含み、請求項５または６に記載の抽出分離機構を備え、熱源側熱交換器の下流と抽出分離機構の抽剤流入配管とを接続し、油分離器の返油回路と抽料流入配管とを接続し、圧縮機の吸入配管と抽剤流出配管とを接続し、圧縮機の吸入配管と抽出液流出配管とを接続したので、あらゆる運転範囲で既設配管中から回収した鉱油を分離することができる。

【０１０２】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１５に記載したように、　圧縮機の吐出側に接続された油分離器を含み、請求項７～１０のいずれかに記載の抽出分離機構を備え、熱源側熱交換器の下流と抽出分離機構の混合管とを接続し、油分離器の返油回路と混合管とを接続し、液戻し管の他端を低圧側の配管もしくは機器に接続し、抽料と抽剤を予め混合配管で混合した後、抽出容器に流入させる。これにより、抽質の抽出を確実に行うことができるので、冷凍サイクルにおいて、既設配管から回収した鉱油にエステル油やエーテル油といったＨＦＣ系冷媒対応の冷凍機油が混合した場合でも、効率よく、かつ、確実に鉱油を分離することができる。

【０１０３】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１６に記載したように、圧縮機の吐出側に接続された油分離器と、請求項８に記載の一体型アキュムレータとを含み、熱源側熱交換器の下流と抽出分離機構の混合配管とを接続し、油分離器の返油回路と混合配管とを接続し、抽料と抽剤を予め混合配管で混合した後、抽出容器に流入させる。したがって、抽出容器をアキュムレータ内に内蔵するため、冷凍サイクルにおいて、既設配管から回収した鉱油にエステル油やエーテル油といったＨＦＣ系冷媒対応の冷凍機油が混合した場合でも、安価に効率よく鉱油を分離することができる。

【０１０４】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１７に記載したように、抽残液貯留容器には、抽残液貯留容器内の液が外部へ逆流することを防止する機構を設けたので、抽残液貯留容器内に貯留された鉱油が、冷媒回路内に再流出することを防止する。

【０１０５】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１８に記載したように、抽残液貯留容器内部には抽残液を吸着する吸着材を設けたので、抽残液貯留容器内に貯留された鉱油を簡易に確実に捕獲できる。

【０１０６】本発明に係る冷凍サイクル装置の熱源機によれば、請求項１９に記載したように、抽剤としてハイ

ドロフルオロカーボン系の冷媒、抽料としてエステル油もしくはエーテル油のいずれかと鉱油もしくはハードアルキルベンゼン油のいずれかとの混合油としたので、エステル油の回収効率を高め、圧縮機の潤滑油が枯渇することを防止し、信頼性を高めることができる。

【０１０７】本発明に係る冷凍サイクル装置の熱源機によれば、請求項２０に記載したように、抽出容器内の温度を、冷凍サイクルの低圧の飽和温度以下としたので、より精度よく鉱油を抽出することができる。

【０１０８】本発明に係る冷凍サイクル装置によれば、請求項２１に記載したように、利用側熱交換器を含む利用側機と、請求項１１～２０のいずれかに記載の熱源機とを接続配管により接続して冷媒回路を構成したので、抽料から抽質の分離を行える冷凍サイクル装置が得られる。

【０１０９】本発明に係る冷凍サイクル装置によれば、請求項２２に記載したように、接続配管として、既設の冷凍サイクル装置の接続配管を利用したので、効率的に更新した冷凍サイクル装置が得られる。

【０１１０】本発明に係る冷凍サイクル装置の更新方法によれば、請求項２３に記載したように、既設の冷凍サイクル装置の熱源機を請求項１１～２０のいずれかに記載の熱源機に置換するとともに冷媒を置換するので、既設の冷凍サイクル装置の接続配管等を利用して更新を行うことができる。

【図面の簡単な説明】

【図１】 本発明の実施の形態１の抽出分離機構を搭載した冷凍サイクルの冷媒回路図を示す図である。

【図２】 本発明の実施の形態１の抽出分離機構の概略構成図である。

【図３】 抽出容器と液面発生容器中の液面レベルを示す模式図である。

【図４】 抽出容器内の鉱油の比率の変化に対する抽出容器と液面発生容器の液面レベルの差の変化を示す図である。

【図５】 三角座標を用いた液相３成分系の相状態を示す図である。

【図６】 液相３成分系の平衡曲線を示す図である。

【図７】 本発明の実施の形態１の抽出分離機構の他の概略構成図である。

【図８】 本発明の実施の形態１の抽出分離機構の他の例における三角座標を用いた液相３成分系の相状態を示す図である。

【図９】 本発明の実施の形態１の抽出分離機構を搭載した冷凍サイクルのその他の例を示す冷媒回路図である。

【図１０】 本発明の実施の形態２の抽出分離機構の概略構成図である。

【図１１】 本発明の実施の形態３の抽出分離機構の概略構成図である。

【図１２】 本発明の実施の形態４の抽出分離機構の概略構成図である。

【図１３】 本発明の実施の形態５の抽出分離機構を搭載した冷凍サイクルの冷媒回路図を示す図である。

【図１４】 本発明の実施の形態５の抽出分離機構の概略構成図である。

【図１５】 本発明の実施の形態５の抽出分離機構の他の概略構成図である。

【図１６】 本発明の実施の形態５の抽出分離機構を搭載した冷凍サイクルの冷媒回路図の他の例を示す図である。

【図１７】 本発明の実施の形態６の抽出分離機構を搭載した冷凍サイクルのその他の例を示す冷媒回路図である。

【図１８】 本発明の実施の形態６の抽出分離機構を搭載した冷凍サイクルの冷媒回路図を示す図である。

【図１９】 本発明の実施の形態７の抽出分離機構を搭載した冷凍サイクルのその他の例を示す冷媒回路図である。

【図２０】 本発明の実施の形態７の抽出分離機構を搭載した冷凍サイクルの冷媒回路図を示す図である。

【図２１】 本発明の実施の形態７の抽出分離機構を搭載した冷凍サイクルの冷媒回路図を示す図である。

【図２２】 本発明の実施の形態８の抽出分離機構を搭載した冷凍サイクルの冷媒回路図を示す図である。

【図２３】 従来例の抽出分離機構の概略構成図である。

【図２４】 他の従来例の抽出分離機構の概略構成図である。

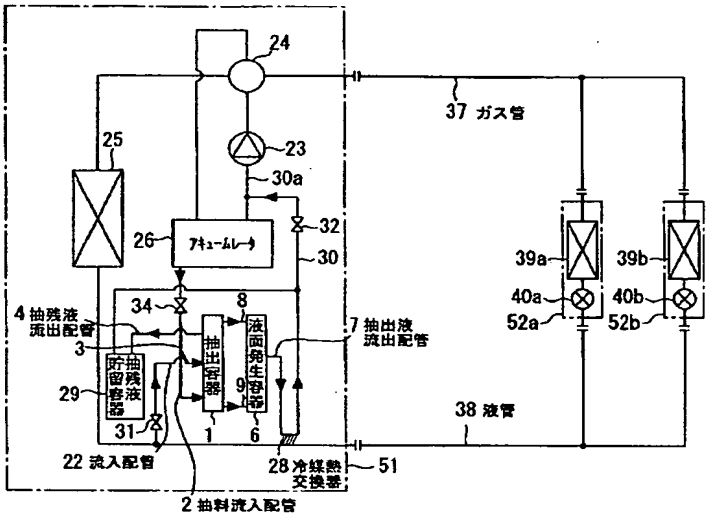
【符号の説明】

１ 抽出容器、 ２ 抽料流入配管、 ３ 抽剤流入配管、 ４ 抽残液流出配管、 ５ 抽出液流出配管、 ６ 液面発生容器、 ７ 流出配管、 ８ 上部連絡管、 ９ 下部連絡管、 １０ シェル、 １１，１２，１３ 仕切板、１４，１５，１６，１７ 孔、 ２０ 外円筒形容器、 ２１ 内円筒形容器、２２ 流入配管、 ２３ 圧縮機、 ２４ 四方弁、 ２５ 熱源側熱交換器、 ２６ アキュムレータ、 ２６ａ 上部空間、 ２６ｂ 下部空間、 ２７液ライン配管、 ２８ 冷媒熱交換器、 ２９ 抽残液貯留容器、 ３０ 配管、 ３０ａ 吸入配管、 ３１，３２ 弁、 ３３ 配管、 ３４ 弁、 返油回路、 ３６ 絞り装置、 ３７ ガス管、 ３８ 液管、 ３９ 負荷側熱交換器、 ４０ 絞り装置、 ４１，４２，４３，４４ 空間、 ４５ 混合配管（吸入配管）、 ５１ 室外機、 ５２ 室内機、 ５３ 油分離器、 ５４返油穴、 ５５ 異物捕獲手段、 ５６，５７ 操作弁、 ５８ 絞り装置、６１ 機械部、 ６２ 副軸受、 ６３ 給油装置、 ６４ 給油管、 ６５フロート、 ６６ 抽出口、 ６７ 抽出配管、 ６８ ＨＦＣを主成分とす

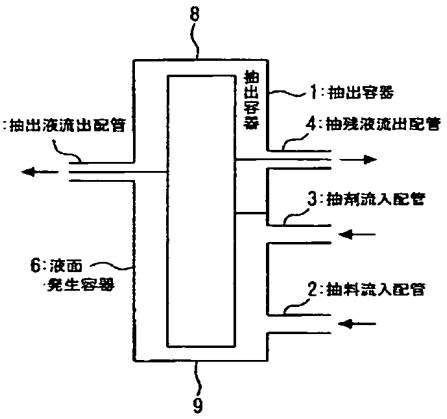
る液状冷媒、　６９　バネ、　７０　密閉ケーシング、　７１　非相溶性潤滑油、　７２　冷媒回路、　７３　通気管、　７４　連通管、　７５　冷媒液戻し管、　７６　気液分離用デミスタ、　７７　返油孔、　７８　絞り、　７９　絞り、　８０　逆止弁、　８１　フロート＊

＊弁、　８２　界面センサ、　８３　仕切板、　８４　Ｕ字管、　８５　背圧管、　８６　配管、　８７　冷媒液吸引管、８８　界面センサ、　８９　電磁弁、　９０　配管、　９１　フロート、　９２フロート式開閉弁、　９３　配管、　９４　空間、　９６　電磁弁。

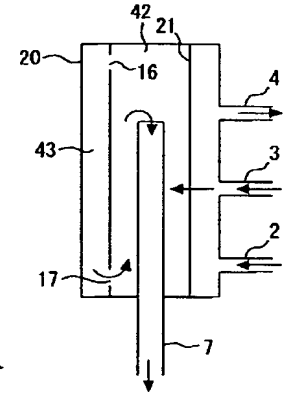
【図１】



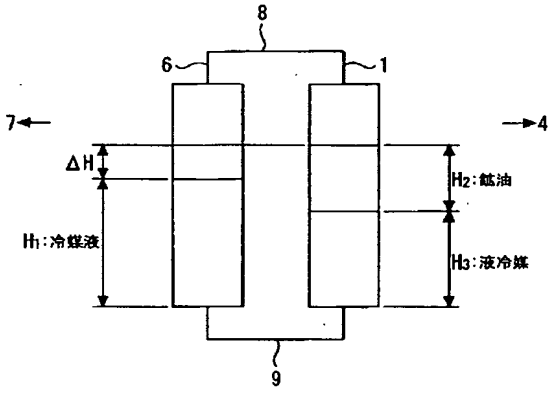
【図２】



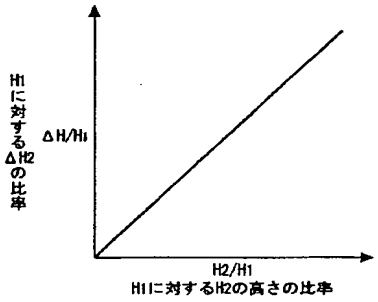
【図１１】



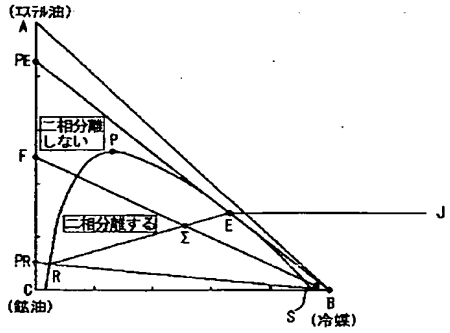
【図３】



【図４】



【図５】



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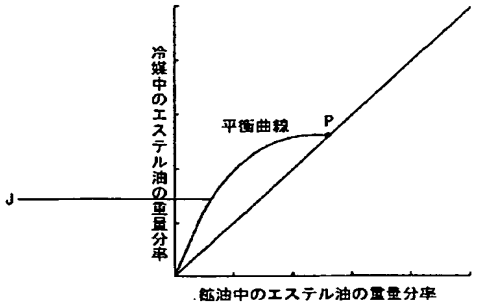

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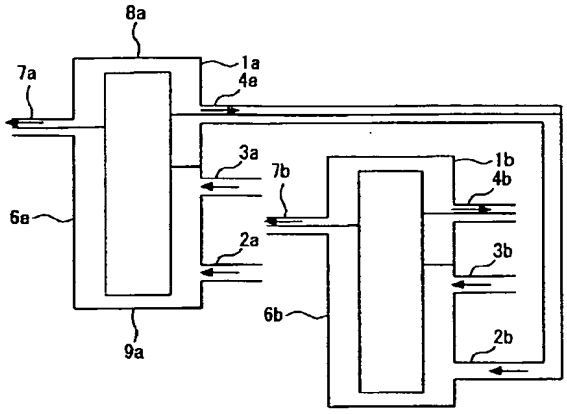
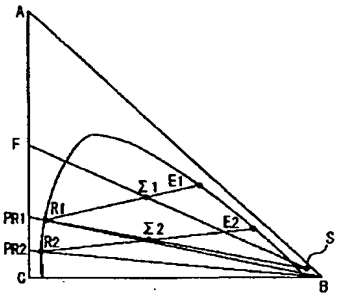


【図８】



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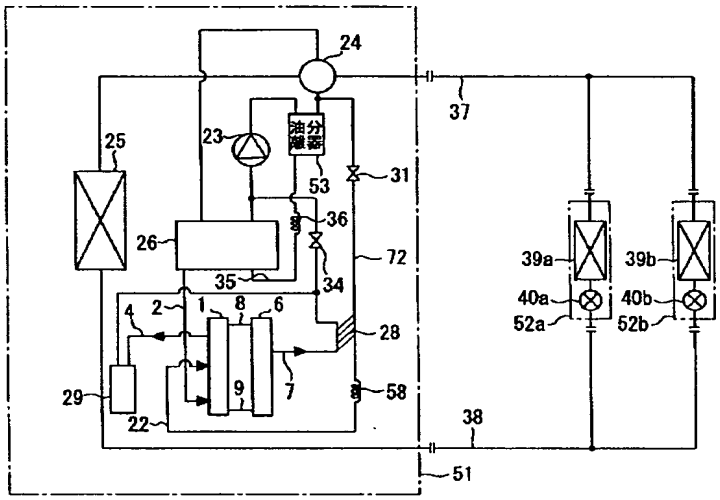
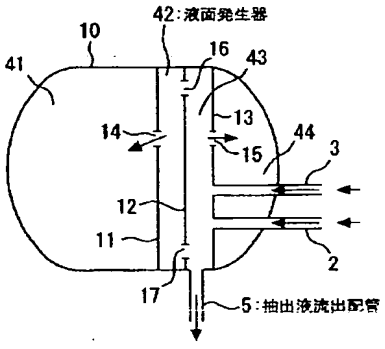
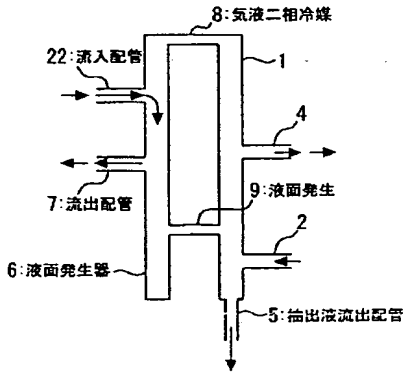


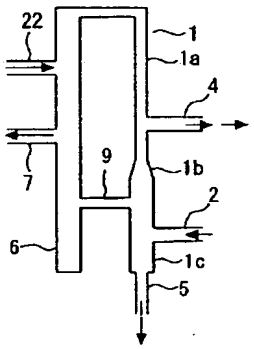
【図１０】



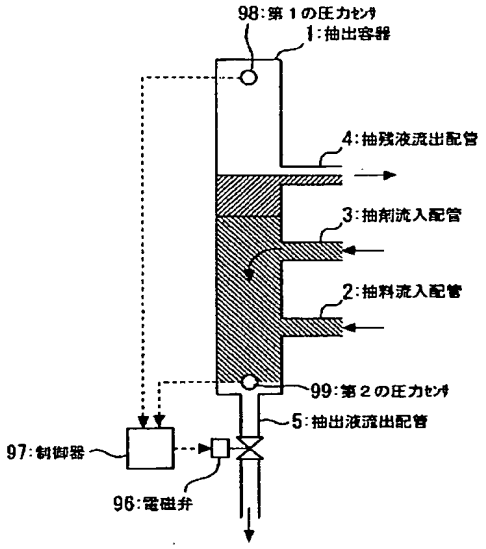
【図１４】



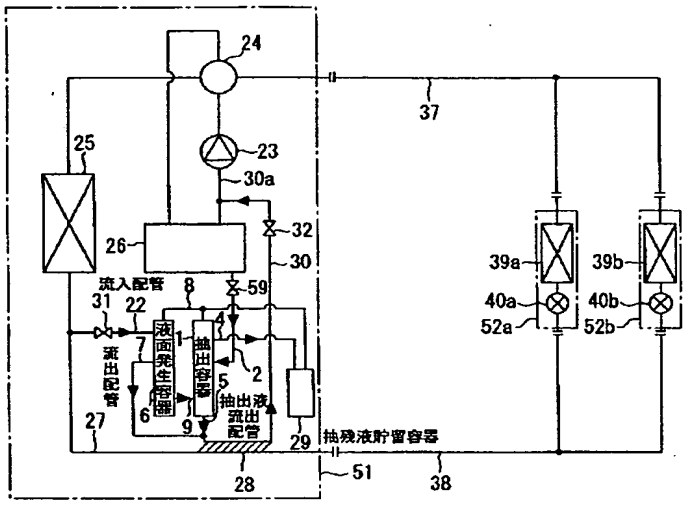
【図１５】



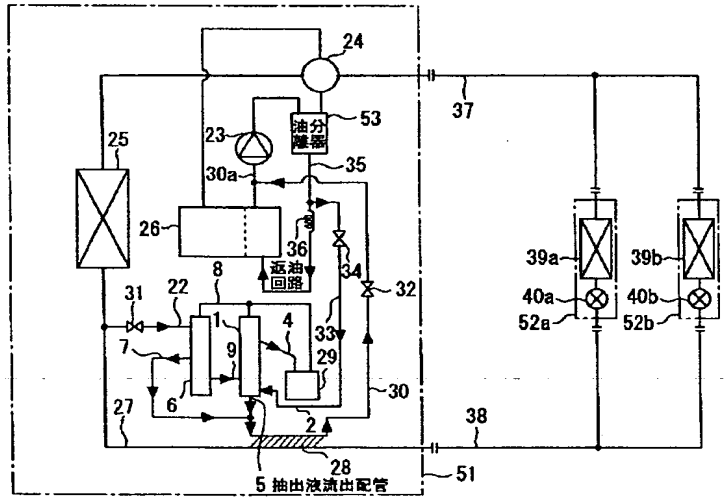
【図１２】



【図１３】



【図１６】



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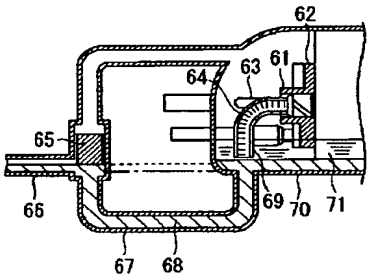
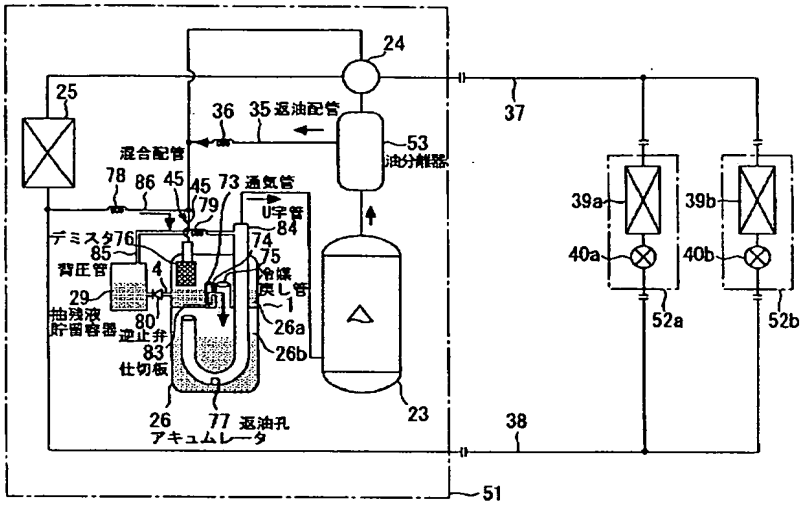
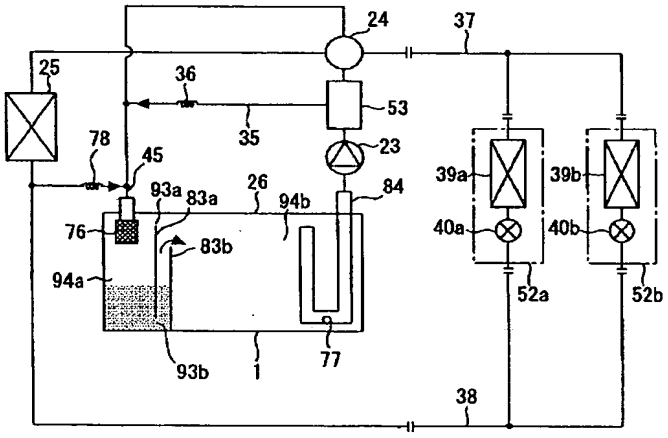


【図１７】


24
25
36
35 返油配管
37
53
油分離器
混合配管
78
86
45
45
73 通気管
79
U字管
84
デミスタ76
74
85
75
背圧管
4
冷媒
戻し管
29
1
油残液
貯留容器
80
26a
逆止弁
83
26b
仕切板
26
77 返油孔
23
38
アキュムレータ
39a
39b
40a
40b
52a
52b
51

【図１８】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39a
39b
93a
83a
26
94b
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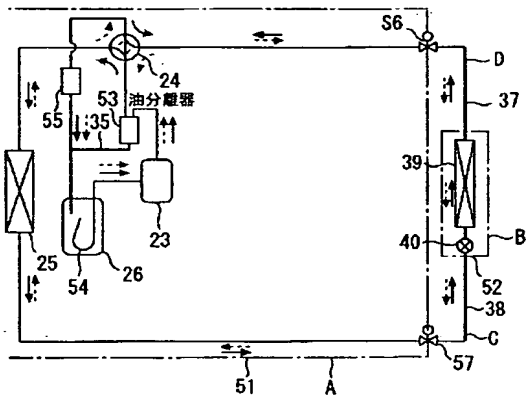
76
83b
94a
52a
52b
93b
1
77
38

【図２３】


S6
D
24
37
53 油分離器
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39
23
40
B
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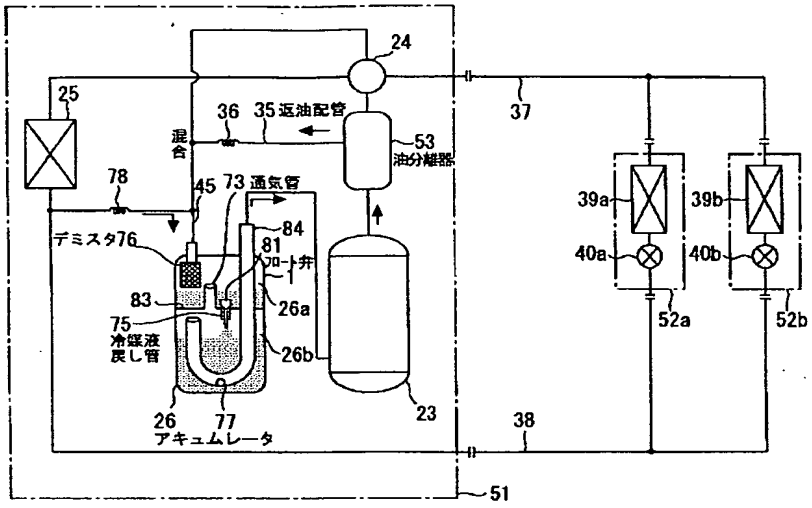
26
54
52
38
C
57
51
A

【図１９】


24
25
36
35返油配管
混合
53
油分離器
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73通気管
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39b
40a
40b
52a
52b
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アキュムレータ
23
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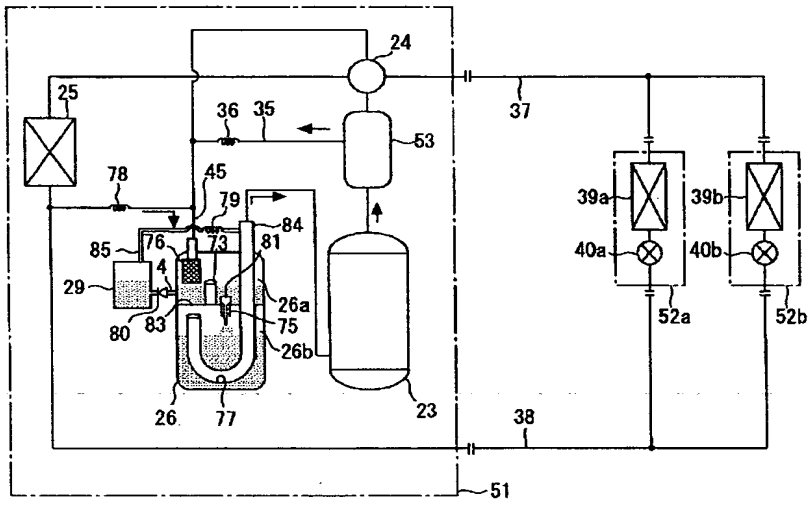
【図２０】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40b
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52b
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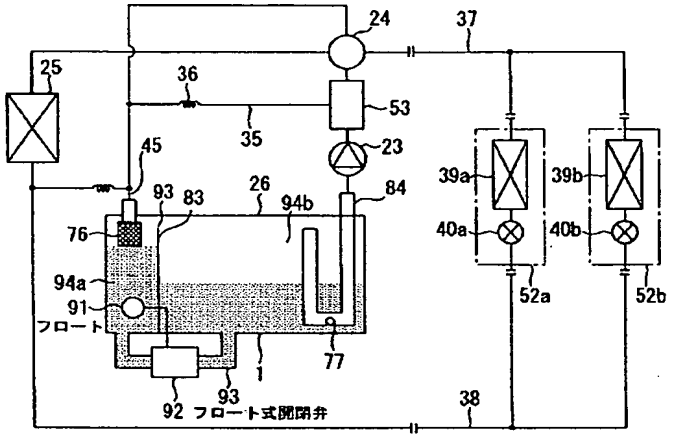
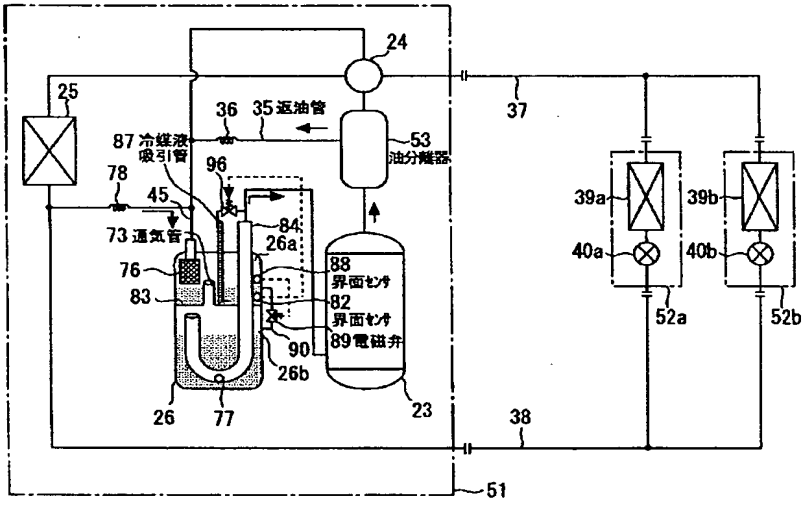
23
38
51

【図２１】



【図２２】



フロントページの続き

(72)発明者　高谷　士郎
東京都千代田区丸の内二丁目２番３号　三菱電機株式会社内
(72)発明者　外山　悟
東京都千代田区丸の内二丁目２番３号　三菱電機株式会社内
(72)発明者　岩本　慎一
東京都千代田区丸の内二丁目２番３号　三菱電機株式会社内
(72)発明者　河西　智彦
東京都千代田区丸の内二丁目２番３号　三菱電機株式会社内